

For the heating engineer

## Installation and maintenance instructions ecoTEC



Gas fired wall hung high efficiency boiler

VU 656/4

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## 1 Notes on the documentation

The following instructions are intended to help you throughout the entire documentation. Further documents apply in combination with this installation and maintenance manual. We accept no liability for any damage caused by non-observe these instructions.

### Other applicable documents and service auxiliaries

- Always observe all installation instructions for structural parts and components of the system when installing the ecoTEC VU. These installation instructions are enclosed with the various system components as well as additional components.
- Also observe all the operating instructions included with the system components.

### Auxiliary service equipment:

The following test and measuring equipment is required for inspection and maintenance:

- CO<sub>2</sub> measuring instrument
- U tube manometer or digital

The manuals for any accessories and controllers used also apply.

### 1.1 Storage of documents

Please pass on these installation and maintenance instructions and all other applicable documents to the owner of the installation who is responsible for keeping these documents for future reference when required.

### 1.2 Safety instructions and symbols

Please observe the safety instructions in this manual for the installation of the appliance!

The symbols used in the manual are explained below:



**Danger!**  
**Immediate risk of serious injury or death!**



**Danger!**  
**Danger of death by electric shock!**



**Danger!**  
**Danger of burning or scalding!**



**Caution!**  
**Potentially dangerous situation for the product and environment!**



**Note!**  
**Useful information and instructions.**

- Symbol for a necessary task

### 1.3 Validity of the instruction manual

These installation instructions apply exclusively to the boiler with the following part number:

Type designation	Article number
ecoTEC VU GB 656/4-5 H	0010004140

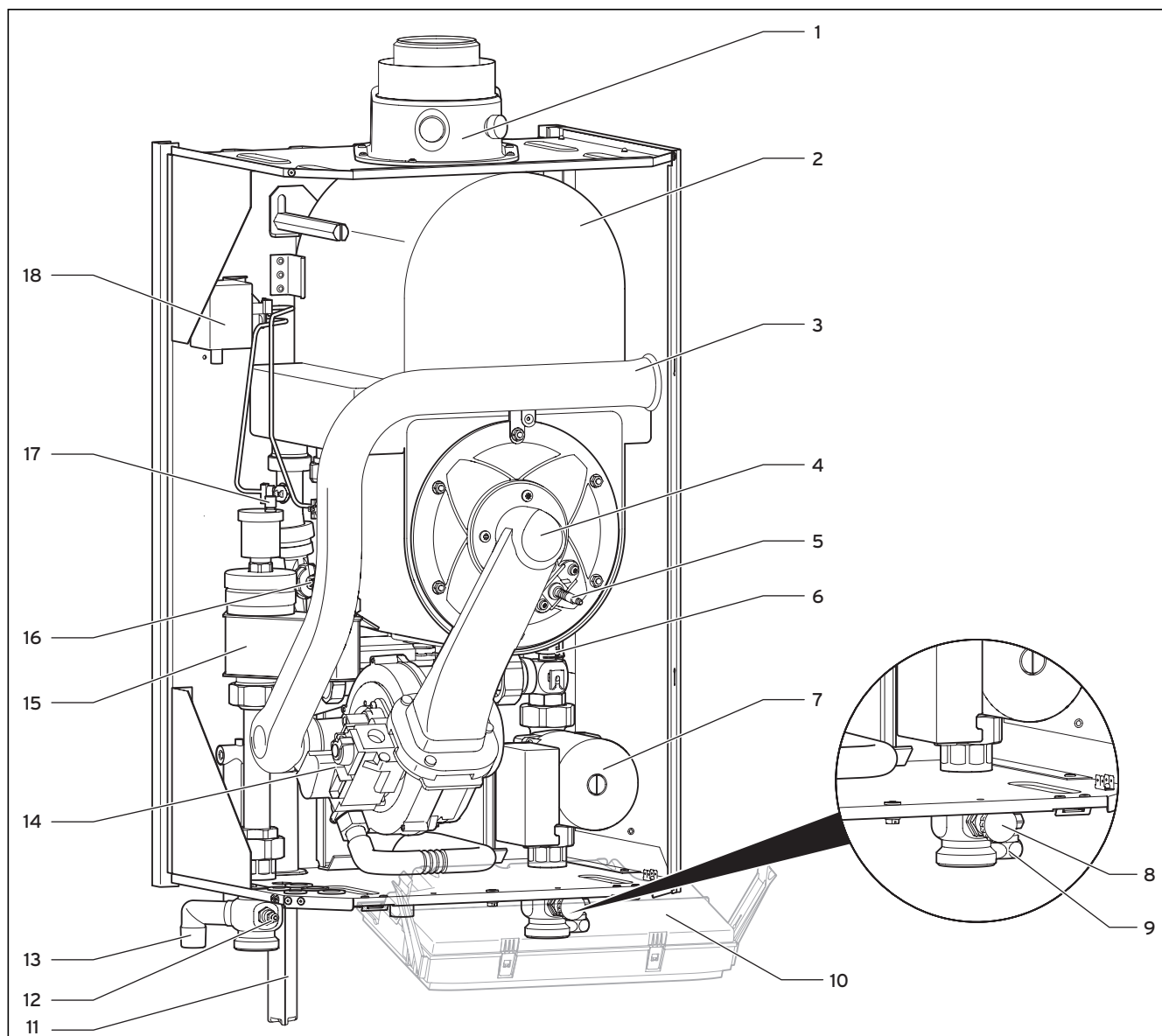
**Table 1.1 Type designation and article number**

The article number of the boiler can be found on the identification plate.

## 2 Description of the boiler

### 2 Description of the boiler

#### 2.1 Design



**Fig. 2.1 Functional components**

#### Legend:

- 1 Connection for the flue pipe
- 2 Heat exchanger
- 3 Air intake pipe
- 4 Compact thermal module with gas valve, fan, mixing tube, burner door and burner
- 5 Ignition electrode
- 6 Water pressure sensor
- 7 Pump
- 8 Connection provision - filling (combined filling and emptying valve)
- 9 Connection provision - expansion vessel
- 10 Electronic box
- 11 Siphon
- 12 Flow line drainage opening

- 13 Connection provision - expansion relief valve
- 14 Gas valve
- 15 Air separation system
- 16 Volume flow sensor
- 17 Automatic air vent
- 18 Flow switch with control lines



#### Note!

**When using accessories observe the minimum separations/mounting clearances (see Chap. 4.5).**

### 2.2 Type summary

Boiler type	Designated country (designation in accordance with ISO 3166)	Category of permit	Type of gas	Nominal heat output range P (kW)
ecoTEC VU GB 656/4-5 H	GB (Great Britain) IE (Eire)	I <sub>2H</sub>	Natural gas H - G20 - 20 mbar	13,8 - 63,7 (80/60 °C) 14,1 - 65,7 (60/40 °C) 14,6 - 67,6 (50/30 °C) 14,9 - 69,2 (40/30 °C)

**Table 2.1 Type summary**

### 2.3 CE label

CE labelling shows that the appliances comply with the basic requirements of the following directives:

- Gas appliances directive (90/396/EEC)
- Electromagnetic compatibility directive (Guideline 89/336/EEC of the council)
- Low voltage directive (Council Directive 73/23/EEC)
- Effectivity guideline (Council Directive 92/42/EEC) as condensing boiler.



#### Note!

**Vaillant Ltd. supports the Benchmark Initiative. You will find the Benchmark Logbook on the last page of this instruction manual. It is very important that this document be filled out properly when installing, commissioning and handing-over to the operator of the installation.**

### 2.4 Intended use

The Vaillant ecoTEC boiler has been constructed using state-of-the-art technology in accordance with recognised safety regulations. Nevertheless, there is still a risk of injury or death to the user or others or of damage to the boiler and other property in the event of improper use or use for which it is not intended.

The Vaillant ecoTEC boilers mentioned in this manual may only be installed and operated in conjunction with the accessories listed in the associated flue system installation manual (see Chap. "Other applicable documents and service auxiliaries").

This boiler is not intended for use by persons (including children) having limited physical, sensory or mental capacities or who have inadequate experience and/or knowledge, unless supervised by a person responsible for their safety or who has been given instructions from them as to how to operate the boiler. Children must be watched to ensure that they do not play with the boiler. The boiler is intended for use as a heater in closed hot water central heating installations. Any other or additional use is considered to be improper.

The manufacturer/supplier will not be held liable for claims resulting from improper use. The user alone bears the risk.

Intended use also includes observance of the operating and installation manual and the inspection/maintenance conditions.



#### Caution!

**Any form of misuse is prohibited.**

### 2.5 Identification plate

The data badge of the Vaillant ecoTEC is attached at the factory to the bottom of the boiler.

## 3 Safety instructions and regulations

### 3.1 Safety instructions

#### 3.1.1 Installation and setting

Assembly, adjustments and maintenance and repairs to the boiler may only be carried out by a recognised skilled trade company.



#### Caution!

**To tighten or loosen screw connections, only use suitable open-ended spanners (do not use pipe spanners, extensions, etc.). Improper use or unsuitable tools can cause damage, such as gas or water leaks.**

#### 3.1.2 Gas odour

If you smell gas, the following safety instructions must be observed:

- Open doors and windows wide, provide for ventilation, stay out of rooms where smell of gas is present!
- Avoid naked flames, do not smoke, do not use pocket lighters!
- Do not use electric switches, plugs, doorbells, telephones and other communication systems in the building!
- Close gas meter isolator device or main isolator device!
- Warn other building residents, but do not ring doorbells!
- Vacate the building!
- If a gas leak is audible, immediately leave the building, prevent others from entering the building, notify the police and fire brigade from outside the building!

## 3 Safety instructions and regulations

- Notify the gas supply company or National Grid Transco 0800 111999 by telephone from outside the building!

### 3.1.3 Changes to the surroundings of the boiler

Changes may not be made to the following equipment:

- the heating appliance,
- gas, supply air, water and power lines- flue gas removal system,
- drain line and expansion relief valve for heating water,
- constructional conditions that could affect the operational reliability of the boiler.

### 3.2 General requirements

#### 3.2.1 Related documents

The installation of the boiler must be in accordance with the relevant requirements of Gas Safety (Installation and Use) Regulations 1998, Health and Safety Document No. 635 (The Electricity at Work Regulations 1989), BS7671 (IEE Wiring Regulations) and the Water Supply (Water Fitting) Regulations 1999, or The Water Bylaws 2000 (Scotland). It should also be in accordance with the relevant requirements of the Local Authority, Building Regulations, The Building Regulations (Scotland). The Building Regulations (Northern Ireland) and the relevant recommendations of the following British Standards:

- BS 6700: Services supplying water for domestic use within buildings and their curtilages.
- BS 6798: Specification for installation of gas fired boilers not exceeding 60 kW input.
- BS 6891: Specification for installation of low pressure gas pipework up to 28 mm (R1) in domestic premises (2<sup>nd</sup> family gas).
- BS 7593: Treatment of water in domestic hot water central heating systems.
- Institute of Gas Engineers Publication IGE/UP/7/1998: „Guide for gas installations in timber framed housing“
- BS. 5482 Pt. 1 Domestic butane and propane gas burning installations.
- IGE/UP1 Soundness testing and purging of industrial and commercial gas installation.
- IGE/UP2 Gas installation pipework, boosters and compressors on industrial and commercial premises. IGE/UP10 Installation of gas appliances in industrial and commercial premises.
- BS. 6644 Installation of gas fired hot water boilers of rated inputs between 60 kW and 2 MW (2<sup>nd</sup> and 3<sup>rd</sup> family gases).
- BS. 5449 Forced circulation hot water central heating systems for domestic premises. Note: only up to 45 kW.
- BS. 6880 Low temperature hot water heating systems of output greater than 45 kW.

Part 1 Fundamental and design considerations.

Part 2 Selection of equipment.

Part 3 Installation, commissioning and maintenance.

BS. 4814 Specification for: Expansion vessels using an internal diaphragm, for sealed hot water heating systems.

BS. 5440 Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2<sup>nd</sup> and 3<sup>rd</sup> family gases).

Part 1 Specification for installation of flues.

Part 2 Specification for installation and maintenance of ventilation for gas appliances.

Furthermore it is essential that the boiler is installed, operated and maintained in accordance with the current state of the art. This applies likewise to the hydraulic system, the flue gas installation and the installation site.

#### 3.2.2 Installation site

The location chosen for the boiler must permit the provision of a satisfactory flue termination. The location must also provide adequate space for servicing and air circulation around the boiler. The boiler may be installed in any room, although particular attention is drawn to the requirements of BS 7671 (IEE Regulations), the electrical provisions of the Building Regulations (Scotland) and in IE the current edition of IS 813 and the current ETCI rules, in respect of the installation of a boiler in a room containing a bath or shower.



#### Note!

**Where a room sealed boiler is installed in a room containing a bath or shower, any electrical switch or boiler control utilising mains electricity should be so situated that it cannot be touched by a person using the bath or shower.**

Where the installation of the boiler will be in an unusual location, special procedures may be necessary and BS 5546 and BS 6798 give detailed guidance on this aspect. The boiler must be mounted on a flat, vertical wall, which must be sufficiently robust to take the weight of the boiler. The boiler may be installed on a combustible wall, subject to the requirements of the Local Authorities and Building Regulations. A compartment used to enclose the boiler must be designed and constructed specifically for this purpose. (An existing cupboard or compartment may be used provided that it is modified for the purpose). Details of essential features of cupboard/compartment design including airing cupboard installations are given in BS 6891. In IE the current edition of IS 813.



## Note!

If the boiler is to be installed in a timber framed building, it should be fitted in accordance with "IGE/UP/7 Edition 2 Gas installations in timber framed and light steel framed buildings".

### 3.2.3 Gas supply

The gas supplier should ensure the availability of sufficient gas volume. A gas meter may only be connected to the service pipe by the supplier of gas or their contractor. An existing meter should be checked to ensure that it is capable of passing the rate of gas supply required. Installation pipes should be fitted in accordance with BS 6891. Pipework from the meter to the boiler must be of an adequate size. Do not use pipes of a smaller size than the boiler gas connection. The complete installation must be tested for soundness and purged as described in BS 6891.

### 3.3 Flue pipe



## Danger!

**Vaillant appliances are only system-certified if genuine Vaillant flue pipes are used. Only use genuine Vaillant flue pipes. Malfunctions can occur if you use other accessories. These may result in damage and injury. You will find a list of genuine flue pipes in the Vaillant installation manual for flue pipes. The CE mark is valid only if the appliance is operated with Vaillant flue pipes.**

Only for commercial appliances:

For boiler installations in cascade arrangement using the appliance type B23p a common non-Vaillant flue system serving more than one appliance shall be used. The requirements of the flue installation instructions must be met.

#### 3.3.1 Standard 125 mm flue pipe

All ecoTEC boilers feature an 80/125 mm diameter air/ flue gas connection as standard. The selection of the optimum system depends on the individual installation and application conditions.

A more detailed description can be found in the accompanying flue pipe installation manual.

For example, you can combine the following air/ flue gas accessories with your boiler:

Concentric system, plastic, Ø 80/125 mm

- Install the flue pipe using the installation instructions supplied with this appliance.

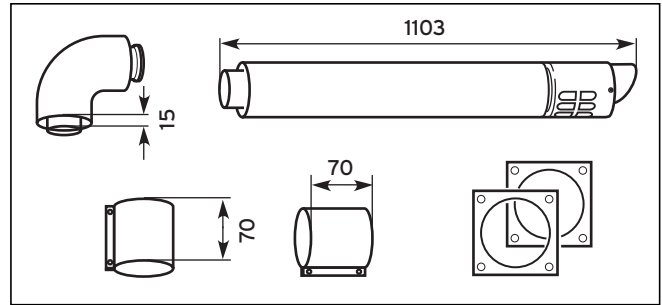


Fig. 3.1 Item No. 303 209

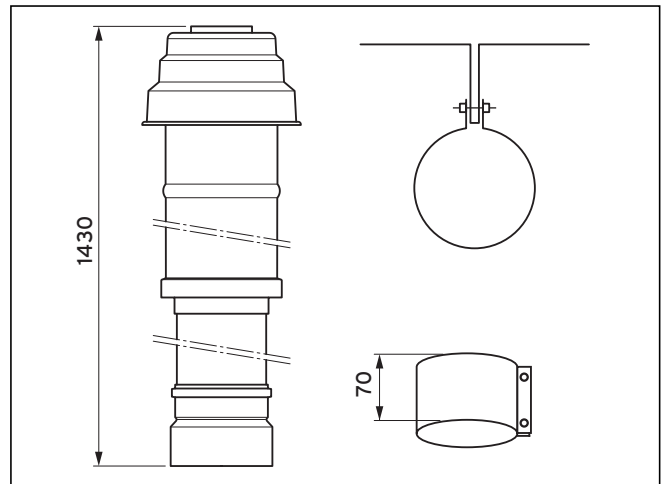


Fig. 3.2 Item No. 303 200

#### 3.3.2 Flue termination

The following details refer to both flue systems.

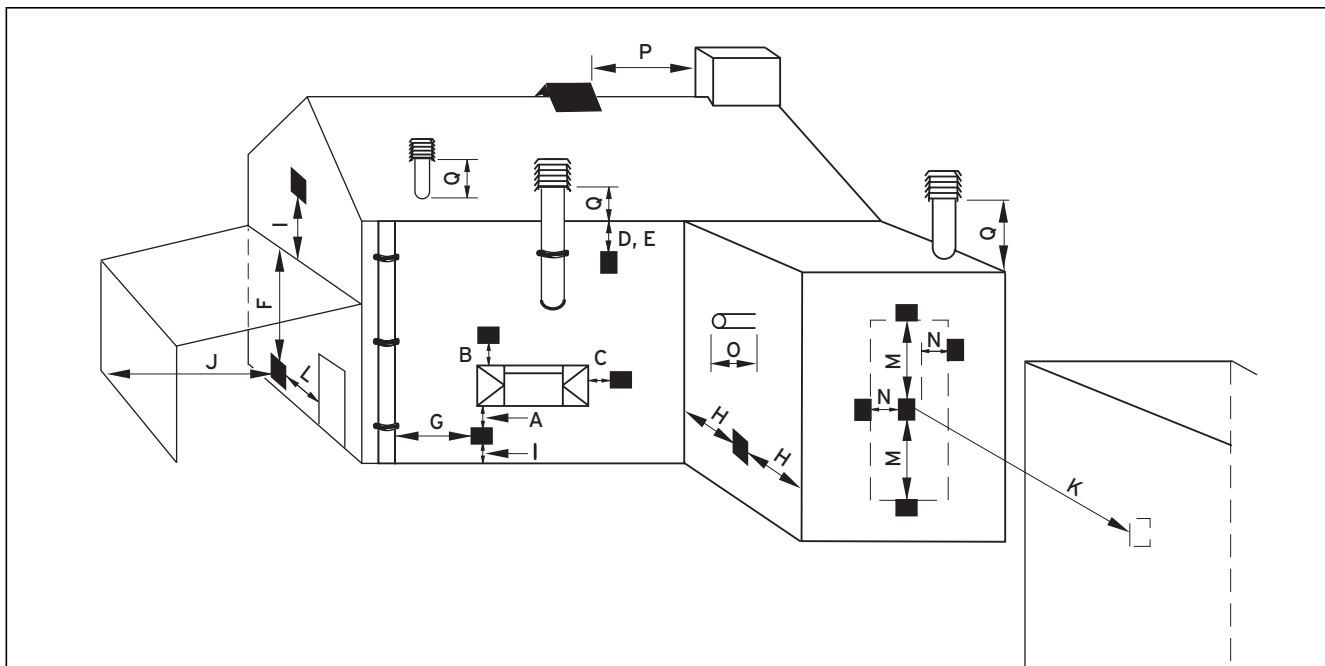
- The terminal must be positioned such that the products of combustion can disperse freely at all times.
- A plume of water vapour will sometimes be visible from the flue terminal. Positions where this could be a nuisance should be avoided.
- If the terminal is fitted less than 2 m above a balcony, above ground or above a flat roof to which people have access then a suitable terminal guard must be provided and fitted (contact Tower Flue Components, Tonbridge, TN9 1TB).



## Note!

**Vertical flues must not terminate within 600 mm of an openable window, air vent or any other ventilation terminal.**

### 3 Safety instructions and regulations



**Fig. 3.3 Termination of the flue pipe**

The flue assembly shall be so placed or shielded as to prevent ignition or damage to any part of the building.

	Location	Minimum dimensions
A	Directly below an opening, air brick, opening windows, etc.	300 mm
B	Above an opening, air brick, opening window, etc.	300 mm
C	Horizontally to an opening, air brick, opening window, etc.	300 mm
D	Below temperature-sensitive building components e.g. plastic gutters, soil pipes or drain pipes	75 mm
E	Below eaves	200 mm
F	Below balconies or car port roof	200 mm
G	From a vertical drain pipe or soil pipe	150 mm
H	From an internal or external corner	200 mm
I	Above ground, roof or balcony level	300 mm
J	From a surface facing the terminal	600 mm
K	From a terminal facing the terminal	1200 mm
L	From an opening in the car port (e.g. door, window) into the dwelling	1200 mm
M	Vertically from a terminal on the same wall	1500 mm
N	Horizontally from a terminal on the same wall	300 mm
O	From the wall on which the terminal is mounted	N/A
P	From a vertical structure on the roof	N/A
Q	Above intersection with roof	300 mm

**Table 3.1 Position of the termination in a fan-assisted concentric flue pipe**



**Note!**

**In addition, the terminal should not be nearer than 300 mm to an opening in the building fabric formed for the purpose of accommodating a built-in element such as a window.**

BS 5440-1 It is recommended that the fanned flue terminal should be positioned as follows:

- at least 2 m from an opening in the building directly opposite, and
- so that the products of combustion are not straightly directed to discharge across a boundary.

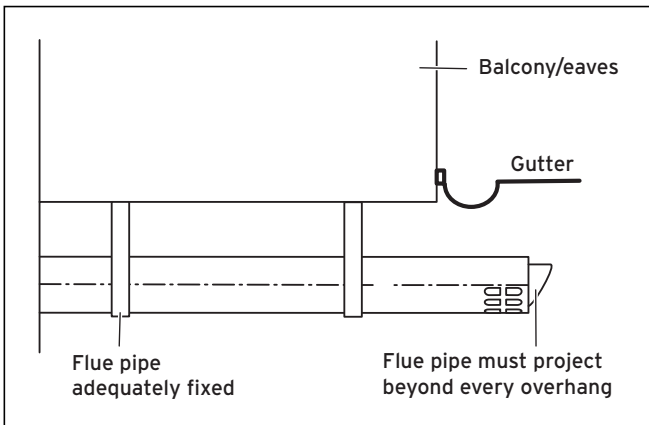
1) Dimensions D, E and F:

These clearances may be reduced to 25 mm without affecting the performance of the boiler. In order to ensure that the condensate plume does not affect adjacent surfaces the terminal should be extended as shown in fig. 3.3.

2) Dimension H:

This clearance may be reduced to 25 mm without affecting the performance of the boiler. However, in order to ensure that the condensate plume does not affect adjacent surfaces a clearance of 300 mm is preferred. For IE, recommendations are given in the current edition of IS 813.





**Fig. 3.4 Termination of flue pipe under balcony or eaves**

### 3.4 Air supply

Detailed recommendations for air supply are given in BS 5440: Part 2. It is not necessary to have an air vent in the room or internal space in which the boiler is installed.

### 3.5 Compartment ventilation

The boilers are very high efficiency appliances. As a consequence the heat loss from the appliance casing during operation is very low. Compartment ventilation is required if the flue used is not concentric and air is supplied from the room or compartment the boiler is installed in.

### 3.6 Electrical supply

A 230 V, ~ 50 Hz single phase electricity supply fused to 3 Amp. must be provided in accordance with the latest edition of BS7671 (IEE Wiring Regulations) and any other local regulations that may apply. In IE reference should be made to the current edition of the ETCI rules. The method of connection to the mains electricity supply must provide a means of completely isolating the boiler and its ancillary controllers. Isolation is preferably by the use of a fused three pin plug and unswitched shuttered socket outlet, both complying with the requirements of BS 1363. Alternatively, a 3 Amp. fused doublepole switch with a 3 mm contact separation on both poles may be used.



**Danger!**

**Risk of fatal electric shock!  
The boiler must be earthed.**

## 4 Assembly

**Caution!**  
**Flush the heating installation thoroughly before installing the boiler to remove foreign substances such as solder and flux residue, leftover sealant or dirt.**

### 4.1 Scope of delivery

The Vaillant ecoTEC is delivered pre-mounted in a package unit.  
 Check that all parts have been delivered and are intact (see Fig. 4.1 and Table 4.1).

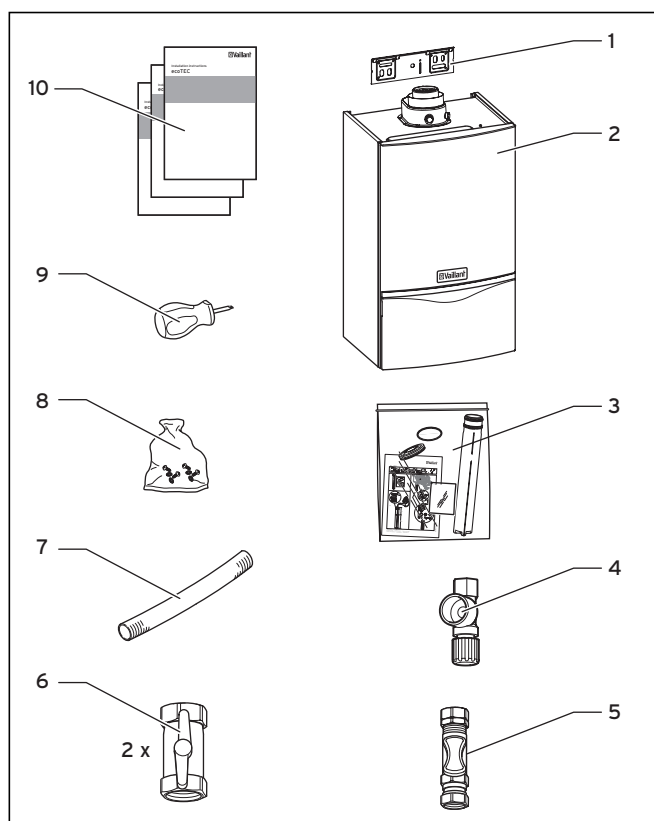


Fig. 4.1 Scope of delivery

### 4.2 Accessories

Optional accessories for use in conjunction with the installation and operation of the boiler are available.

### 4.3 Installation site

Please note the safety instructions below before choosing where to install the boiler:

**Caution!**  
**Do not install the boiler in rooms prone to frost. In rooms with aggressive steam or dust, the boiler must be operated independently of the ventilation!**

When choosing the installation site and while operating the boiler, make sure that the combustion air is technically free of chemical substances containing fluorine, chlorine, sulphur etc. Sprays, solvents and cleaning agents, paints, adhesives etc. contain these kinds of substances, which in the worst case can lead to corrosion, also in the flue system, during ambient air dependent operating of the boiler.

The boiler must be operated independently of the ambient air, particularly in hairdressing salons, carpenter's shops, or paint shops and cleaning companies. Otherwise, a separate installation room is required to guarantee that the combustion air supply is technically free of the substances mentioned above.

Position	Number	Name
1	1	Hanging bracket
2	1	Boiler
3	1	Installation kit for siphon cartridge
4	1	Expansion relief valve
5	1	Gas isolation valve
6	2	Stop cocks
7	1	Condensate drainage hose
8	1	Bag containing hardware (assembly kit): - 2 wood screws - 2 wall plugs 10 x 60 mm - 2 washers - 1 seal - 1 crimp connection
9	1	Tool for the gas valve
10	1	Bag with printed documents: - Installation and maintenance instructions - Operating manual - Installation instructions, air/flue gas duct system - Installation template - Miscellaneous stickers

Table 4.1 Scope of delivery

### Select position of boiler

Refer to section 'Installation site' for information regarding the siting of the boiler. In general the boiler must be positioned such that:

- There is sufficient space around the boiler for service and maintenance.
- The boiler can be correctly flued, i.e. the flue terminal position is sited in accordance with these instructions and the air/flue duct can be installed in accordance with the flue installation instructions supplied.
- All necessary pipework can be connected, including the pressure relief valve and condensate drain.

#### 4.4 Dimension drawing and connection dimensions

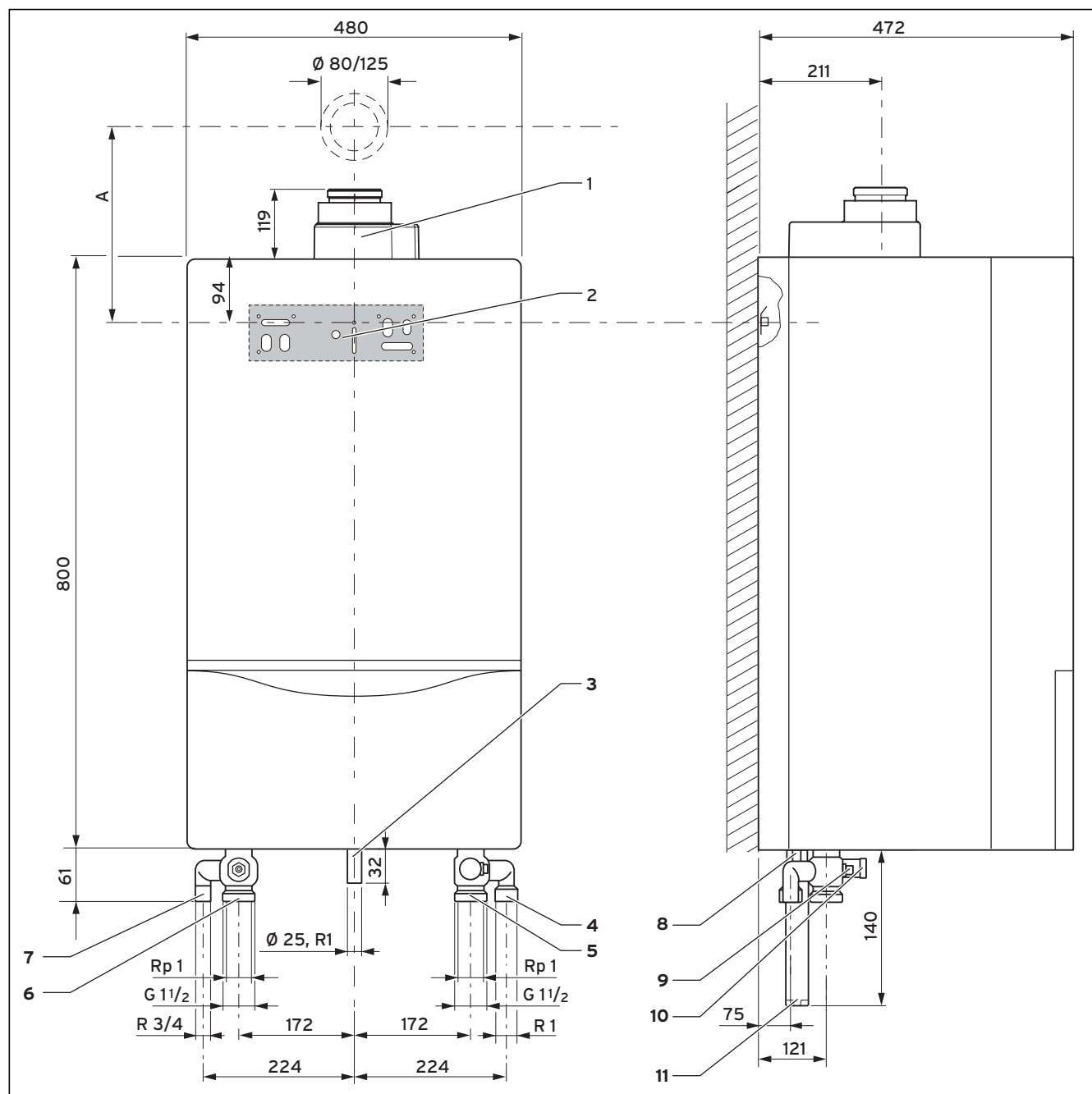


Fig. 4.2 Connection dimensions in mm

##### Legend:

- 1 Flue gas connection, 80/125 mm diameter, dimension A (hanging bracket - centre of air/flue gas pipe) with 87° elbow: 297 mm
- 2 Hanging bracket
- 3 Gas pipe, 25 mm diameter, gas connection R1"
- 4 Connection provision - expansion vessel
- 5 Connection for heating return
- 6 Connection for heating flow
- 7 Connection provision - expansion relief valve
- 8 Connection for condensate drain pipework

- 9 Flow line drainage opening
- 10 Connection provision - filling (combined filling and emptying valve)
- 11 Siphon cartridge



**Note!**  
When using accessories observe the minimum separations/mounting clearances (see Chap. 4.5).

## 4 Assembly

### 4.5 Required minimum gaps/assembly clearances

For the installation/assembly of the boiler as well as for carrying out future maintenance tasks, you need the minimum gaps and assembly clearances given below:

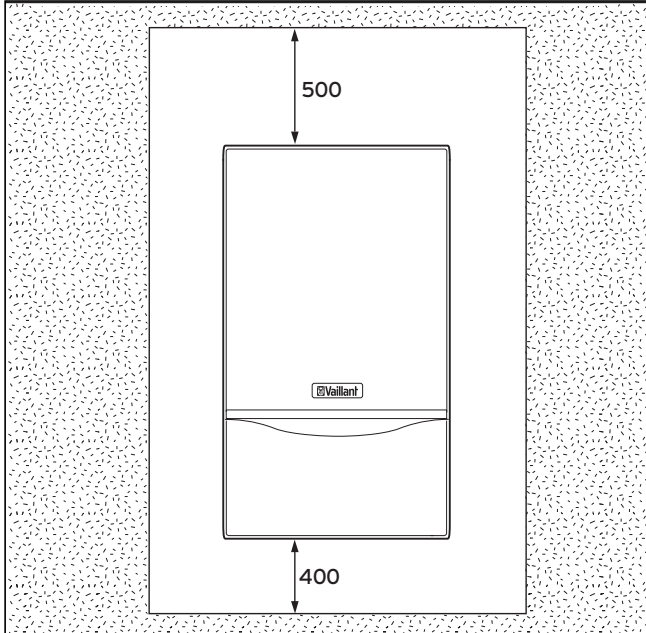


Fig. 4.3 Required minimum gaps/assembly clearances

It is not necessary to ensure sufficient clearance between the boiler and combustible materials or components as the temperature of the boiler will always be less than the maximum permissible temperature of 85 °C due to its rated heating output.

### 4.6 Using the installation template

Only use the assembly template provided to mount the boiler.

- Align the installation template vertically and fix it to the wall.
- Mark the positions of the drill holes for the hanging bracket and also the position of the wall opening for the flue pipe on the wall.
- Remove the assembly template from the wall.
- Drill 2 holes for the hanging bracket in the wall, each with a diameter of 8 mm.
- If necessary cut the aperture in the wall for the flue pipe.

### 4.7 Mounting the boiler



#### **Danger!**

**Danger of personal injury and damage to property from falling boiler!**

**When assembling the boiler make sure that the fixing point has a sufficient load-bearing capacity. Also take the condition/nature of the wall into account.**

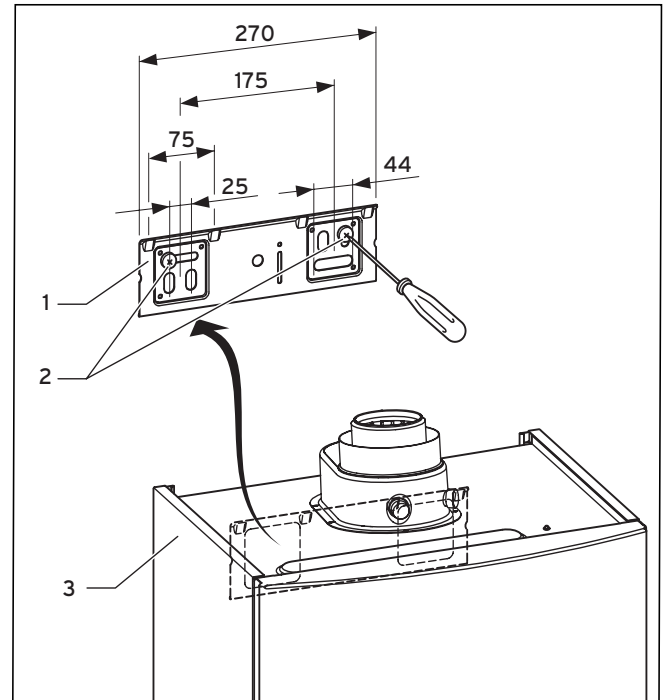


Fig. 4.4 Mounting the boiler

- Mount the hanging bracket (1) on the wall using the wall plugs and screws (2) provided with the boiler.
- Hang the boiler (3) on the hanging bracket from above using the suspension bracket.

#### 4.8 Removing/attaching the front casing

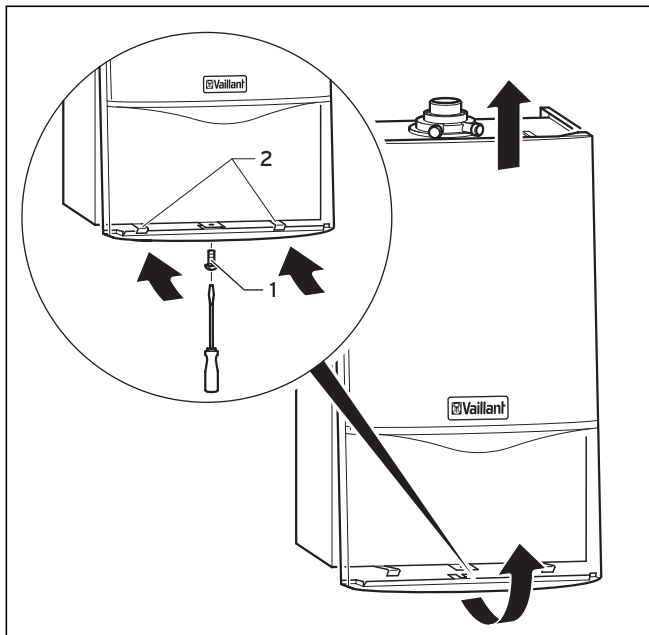


Fig. 4.5 Removing the boiler casing

To dismantle the front casing of the boiler, proceed as follows:

- Unfasten the screw (1) on the bottom of the boiler.
- Push in both retaining clips (2) on the bottom of the boiler so that the front casing is released.
- Pull the casing forwards by its bottom edge and lift the casing up and off.

To mount the front casing of the boiler, please proceed as follows:

- Place the casing on the upper boiler ensuring that the casing and boiler lips engage.
- Push the casing onto the boiler so that the retaining clips (2) on the casing click into place.
- Fix the casing by tightening the screw (1) on the bottom of the boiler.

## 5 Installation



### Danger!

**Danger of injury to persons and/or material damage due to improper installation!**  
The Vaillant ecoTEC boiler may only be installed by a recognised skilled trade company, who also assumes the responsibility for proper installing and initial start-up of the boiler.

Take particular care to fit the siphon cartridge during installation.



### Caution!

The ecoTEC VU 656 must be used with a suitably sized low loss header.

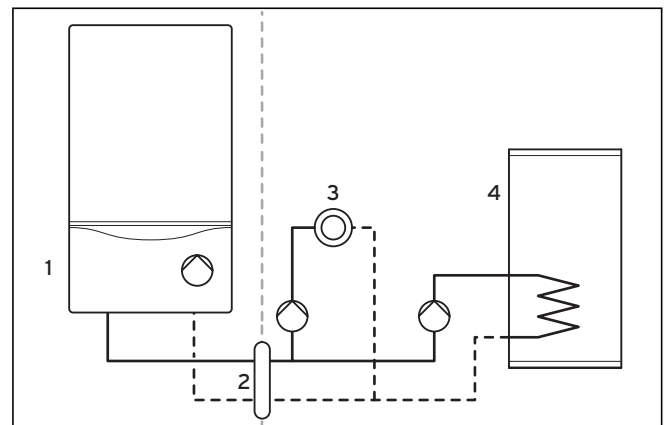


Fig. 5.1 Appliance circuit and heating circuit/cylinder charging circuit

### Legend:

- 1 Boiler with pump
- 2 Low loss header
- 3 Consumer (e.g. heating circuit)
- 4 Cylinder



### Note!

**We strongly recommend the installation of a suitably sized quality dirt separator in the return pipe work to the low loss header (not to the boiler!) particularly in the case of old systems. This will help to prevent any system water contamination from entering and blocking the boiler and producing an additional high pressure loss.**

## 5 Installation

### Selection of the low loss header

The low loss header uncouples the boiler from the heating system. A sufficiently large water volume is constantly supplied through the boiler via the low loss header in conjunction with the boiler pump. It acts as a neutral point in the system and has minimal hydraulic resistance, therefore the boiler pump does not affect the circuit pumps and vice-versa.

A suitable WH type low loss header can be chosen from Table 5.1.

Output of heating system	Temperature difference of heating system		
	10 K	15 K	20 K
Stand-alone boiler	WH 160	WH 95	WH 95
Two cascade arrangement	WH 280	WH 160	WH 95
Three cascade arrangement	WH 280	WH 280	WH 160

**Table 5.1 Selection of the low loss header**

No electrical accessories are required in order to use a low loss header. Simple systems can be connected directly inside the electronic box.

Model	Article-number	Connection Sizes 1	Header width A	Header depth B	Total height C	Insulation dimensions	To boiler D	To heating circuit E	Height from floor F	Maximum volume flow m <sup>3</sup> /hr
WH 95	306721	2" BSP (f)	155	155	750	155/155	470	540	n/a	8
WH 160	306726	DN65	520*	120	1350	220/220	900	900	300	12
WH 280	306725	DN80	600*	160	1390	260/260	930	930	300	21.5

**Table 5.2 Low loss headers dimensions**

All dimensions in mm

\* = distance between flanges

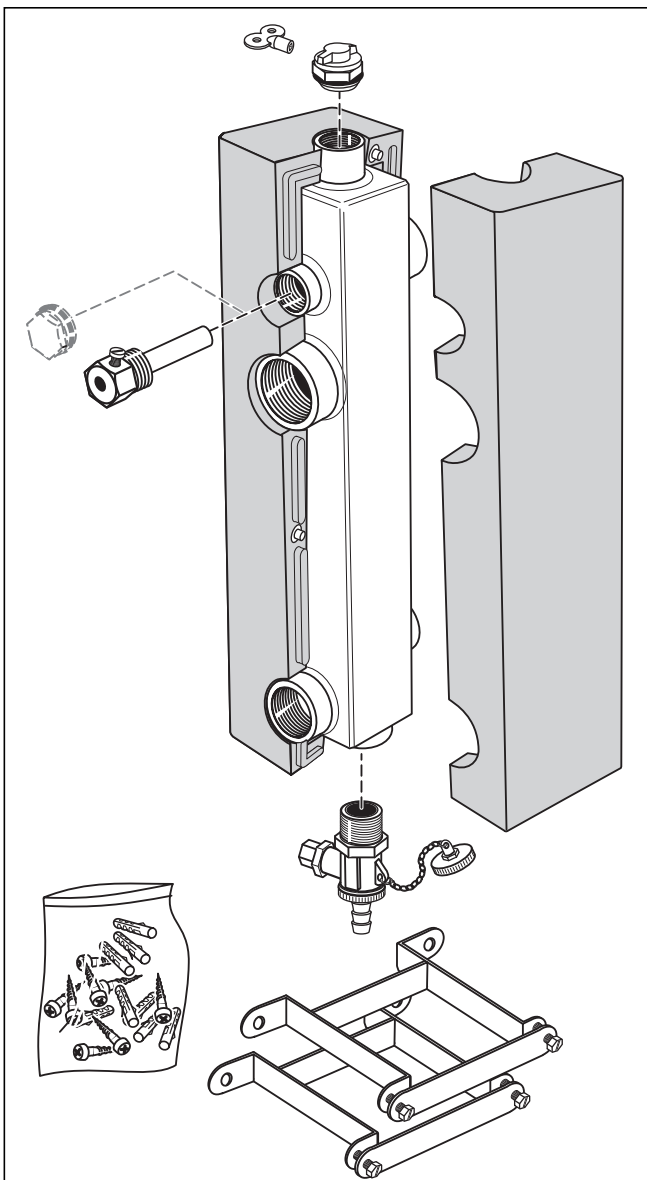


Fig. 5.2 Low loss header

## Safety devices

- The outlet of the pressure relief valve must be suitably terminated in accordance with BS 6798 or BS 6644.
- The boiler is suitable for connection to plastic centralheating pipes. It is preferred that the connections to the boiler are made in copper for the first 1.5 metres prior to the transition to plastic.
- Should a system be found to include non-oxygen barrier pipe then it is essential that a plate heat exchanger be installed in between the boiler and the non-oxygen barrier pipe. It is essential that the boiler and the system have provision for water make up and expansion.

For more detailed information on examples of systems and system equipment contact your Vaillant sales support point.



## Danger!

**Danger of personal injury and material damage!**  
The following system diagrams are schematic representations. They cannot be regarded as a substitute for professional planning! The system diagrams do not include the isolator and safety devices that are required to carry out a professional installation. Observe the applicable standards and guidelines.

The boiler can be installed in three different configurations:

- heat only,
- cylinder only, and
- heating and cylinder.

## 5 Installation

### 5.1 Heating mode

In case of only one heating circuit to be operated downstream of the low loss header, this one can directly be controlled by the ecoTEC.

A suitable pump can be selected and installed downstream of the low loss header. You can select a pump that fits to your system. In case of systems with multiple circuits please pay attention to the additional control system accessories.

#### Hydraulic schematic drawing: Heating circuit connection using low loss header

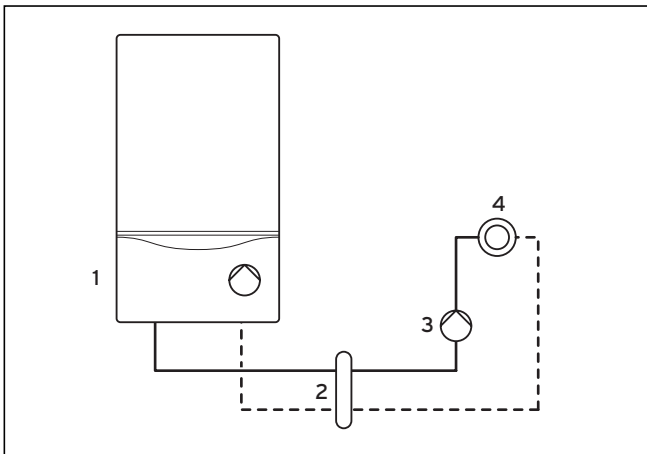


Fig. 5.3 Heating circuit connection using low loss header

#### Legend:

- 1 Boiler with internal pump
- 2 Low loss header
- 3 External heating pump
- 4 Consumer (e.g. heating circuit)

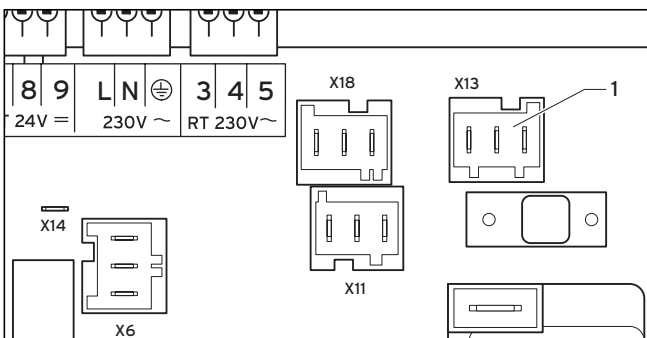


Fig. 5.4 Electrical connection for heating pump downstream of the low loss header

The settings for the internal pump are made at the factory. The pump output can be reset to your own requirements via diagnosis point "d.14", see Chap. 9.1.2. Use the grey ProE plug to establish the electrical connection with the external heating pump. To assign the "external heating pump" function to the plug (1) (additional relay) the value "2" must be specified at diagnosis point "d.26" in the 2nd diagnosis level, see Chap. 9.1.2.

The low loss header ensures, in conjunction with the boiler circulation pump, that a sufficiently high minimum quantity of water is always circulating through the boiler.

### 5.2 Cylinder charging mode

The electronics of the ecoTEC are designed in such a way that one cylinder charging circuit and one heating circuit can be connected directly without the need for accessories. As the charging circuit is connected downstream of the low loss header this means that the size of the cylinder and the specific cylinder primary pump can be selected according to individual requirements.



#### Note!

**Observe that non-return valves or mixer circuits may be required in order to eliminate cross-flow to other circuits or the effects of high temperatures from the charging circuit.**

#### Hydraulic schematic drawing: Hot water priority via low loss header

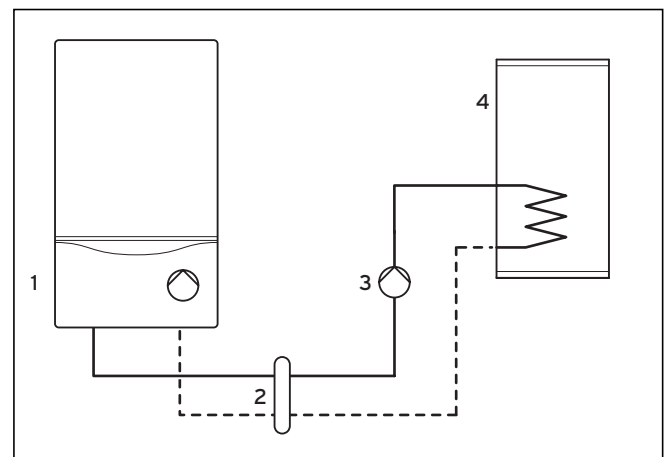


Fig. 5.5 Hot water priority via low loss header

#### Legend:

- 1 Boiler with internal pump
- 2 Low loss header
- 3 External heating pump
- 4 Consumer (e.g. charging circuit)

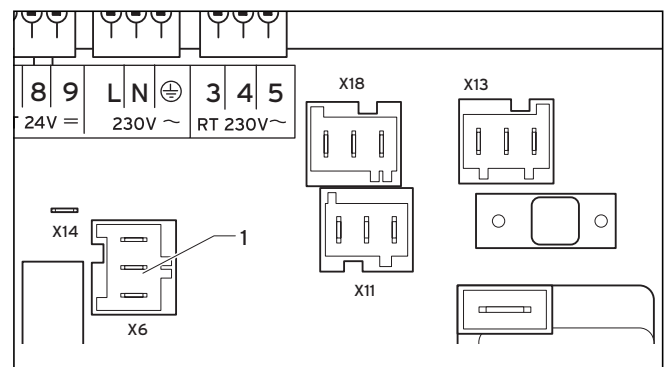


Fig. 5.6 Electrical connection for cylinder charging pump



Use the mounted ProE plug (1) to establish the electrical connection for the cylinder charging pump. The pink plug-in location X6 (1) on the PCB is reserved for the cylinder primary pump. It is not necessary to do settings at any diagnosis point.

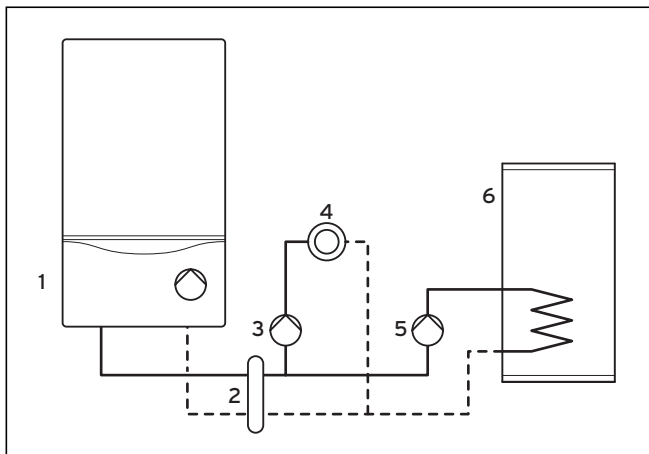
The low loss header ensures, in conjunction with the boiler circulation pump, that a sufficiently high minimum quantity of water is always circulating through the boiler.

## 5.3 Heating mode and charging mode

**Note!**  
Also observe Chap. 5.1 and 5.2 of this manual.

The combination of heating mode and cylinder charging mode of the boiler can not be equated with either heating mode or cylinder charging mode. For faultless operation, both operating modes must be carefully planned for the system. The boiler is uncoupled from the consumer circuits by the low loss header. This means that the circuits downstream of the low loss header can be designed according to individual requirements (pump dimension, cylinder position).

### Hydraulic schematic drawing: Hot water priority and heating circuit via low loss header



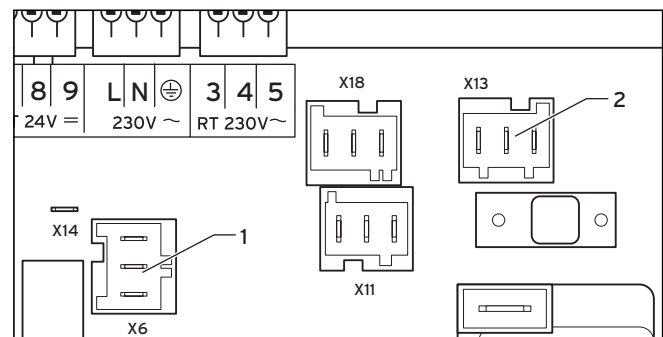
**Fig. 5.7 Hot water priority and heating circuit via low loss header**

#### Legend:

- 1 Boiler with internal pump
- 2 Low loss header
- 3 External heating pump
- 4 Consumer (e.g. heating circuit)
- 5 External cylinder primary pump
- 6 Cylinder

A direct heating circuit and one hot water cylinder (including charging pump and non-return valve) can be connected downstream of the low loss header to the ecoTEC boiler without additional equipment. If additional heating circuits are required this can be achieved with the use of optional controllers and hydraulic accessories (e.g. VRC 630). The available pump head from the boiler is sufficient to pump water around the shunt circuit between the boiler and low loss header. All heating circuits and hot water cylinder configurations can be connected downstream of the low loss header.

**Note!**  
Observe that non-return valves or mixer circuits may be required in order to eliminate cross-flow to other circuits or the effects of high temperatures from the charging circuit.



**Fig. 5.8 Electrical connection for cylinder primary pump and external heating pump**

#### Legend:

- 1 Plug-in location for cylinder primary pump
- 2 Plug-in location for external heating pump

Use the relevant mounted ProE plug to perform the electrical connection.

The pink plug-in location X6 (1) on the PCB is reserved for the cylinder primary pump. It is not necessary to do settings at any diagnosis point.

To assign the "external heating pump" function to the grey plug (2) (additional relay) the value "2" must be specified at diagnosis point "d.26" in the 2<sup>nd</sup> diagnosis level, see Chap. 9.1.2.

## 5 Installation

### 5.4 Gas connection



#### **Danger!**

**Danger of injury to persons and/or material damage due to improper installation!**  
The Vaillant ecoTEC boiler may only be installed by a recognised skilled trade company who also assumes the responsibility for proper installation and initial start-up of the boiler. The legal directives and the local regulations for gas supply companies must be observed.



#### **Caution!**

**Ensure strainless assembly of the gas pipes to avoid leakages!**



#### **Note!**

**Maintain the same gas pipe dimension all the way to the boiler and avoid reducing the dimension downstream of the gas meter.**



#### **Caution!**

**The gas valve may be damaged if the test pressure or operating pressure is exceeded! You must check the tightness of the gas valve only using a maximum pressure of 110 mbar! The operating pressure must not exceed 60 mbar!**

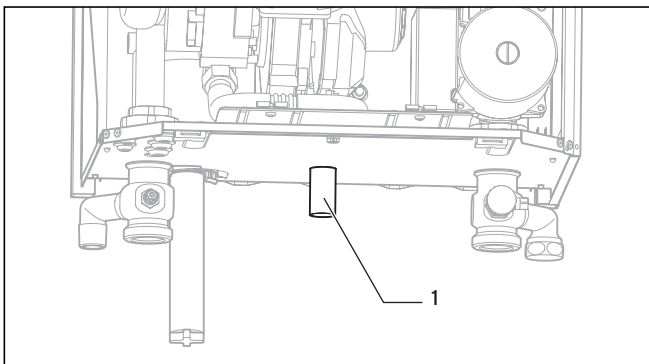


Fig. 5.9 Fitting the gas connection

The boiler must be connected to your gas pipe via a gas isolation valve.

- Screw the boiler's gas supply pipe (1) gas-tight with the gas isolation valve (3, see Fig. 5.10). To do this, use the R3/4 compression fitting supplied with the boiler. This is suitable for the connection of a R3/4 gas isolation valve.
- Inspect the gas connection for leakage.

### 5.5 Heating connection



#### **Caution!**

**Ensure strainless assembly of the supply lines to avoid leakages in the heating system!**

The boiler is connected to the heating flow and return via service valves.

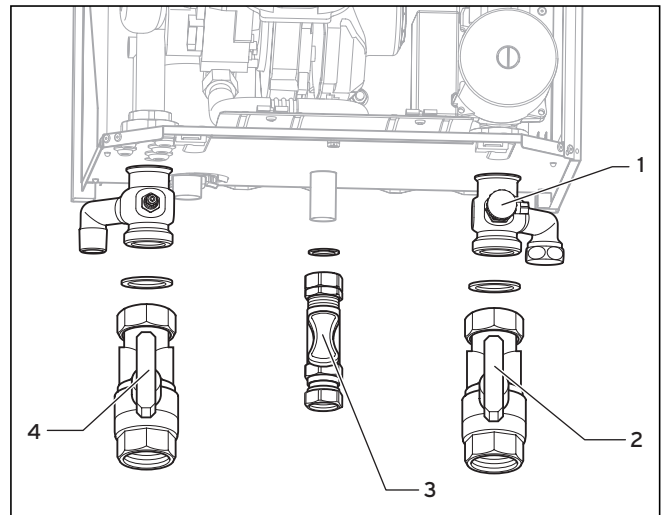


Fig. 5.10 Heating connection

- Fit the flow, return and gas isolation valves (2, 3, 4) including the seals onto the flow, return and gas pipes. Do not overtighten and ensure the joints are checked for leaks after fitting.



#### **Caution!**

**It is essential to use the combined filling and emptying valve (1) in the return for filling the boiler without fail, as otherwise the bleeding of the boiler cannot be ensured. You must implement the filling in accordance with standards.**



#### **Note!**

**We recommend the use of seals made of a fibre-based material similar to cardboard instead of materials similar to rubber as the latter can plastically deform and cause pressure losses.**

## 5.6 Expansion relief valve (safety group), heating installation

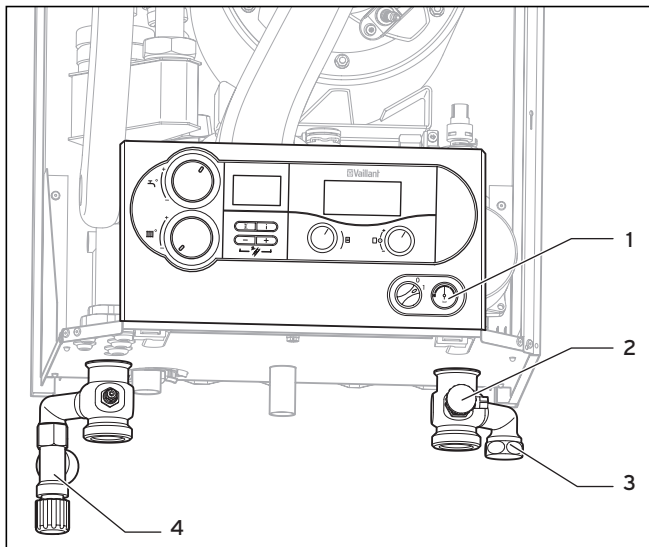


Fig. 5.11 Fitting the safety valve

The ecoTEC is equipped ex factory with connections for a safety group:

- Pressure gauge (1)
- Filling device (combined filling and emptying valve) (2)
- Connection for expansion vessel (3)
- Expansion relief valve (4)

As an accessory the expansion relief valve for the heating installation is delivered with the boiler.

- Install the expansion relief valve (4).
- Fit a sufficiently sized expansion vessel (to be provided on site) at the designated connection (3).



### **Danger!**

#### **Danger of burning and scalding!**

**The expansion relief valve (4) must be noticeable! Terminate the line in such a way that escaping water or steam cannot cause injury to persons.**

**Please note that the end of the line must be visible.**



### **Caution!**

#### **Risk of damage!**

**The line should be terminated in such a way that cables or other electrical components cannot be damaged.**

## 5.7 Condensate drain pipework

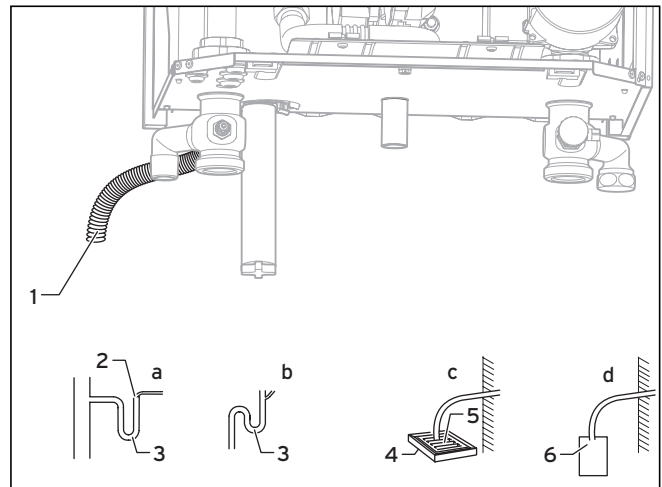


Fig. 5.12 Condensate drain pipework

### **Legend:**

- a Internal stackpipe
- b Internal discharge system
- c Gully
- d Soakaway

The ecoTEC boilers are equipped with a usual condensate collector from which the condensate is continuously removed via the drain pipe.

- Connect the condensate drain of the boiler to a condensate drain hose (1) which has a minimum internal diameter of 19 mm (22 mm outside diameter for all external pipes) and should be made from an acid-resistant material (e.g. plastic overflow pipe).



### **Note!**

**The drain hose connected to the condensate drain of the boiler must have a fall throughout its entire length (45 mm per metre) and should be installed and connected within the building to prevent freezing.**

The condensate drain hose must terminate in a suitable location, e.g.:

- a) Preferably the drain hose should run and terminate internally to the house soil and vent stack (at least 450 mm above the invert of the stack). A siphon giving a water seal of at least 75 mm (3) (built into the boiler) should be incorporated into the pipe run, and there must be an air break (2) in the drain hose upstream of the siphon. The connection to the stack should not be made in a way that could cause cross flow into any other branch pipe, or from that branch pipe into the condensate drainpipe. This can be achieved by maintaining an offset between branch pipes of at least 110 mm on a 100 mm diameter stack and 250 mm on a 150 mm diameter stack.

## 5 Installation

- b) connecting into the internal discharge branch (e.g. sink waste) with an external termination, the condensate draining pipe should have a minimum diameter of 22 mm with no length restriction and should incorporate a siphon with a 75 mm (3) (built into the boiler) seal. The connection should preferably be made down stream of the sink waste siphon. If the connection is only possible upstream, then an air break is needed between the two siphons. This is normally provided by the sink waste.
- c) terminating in a gully (4) below grid level (5) and above the water level. The external pipe length should be kept as short as possible to minimise the risk of freezing and should not be more than 3 m.
- d) at a condensate absorption point (soakaway) (6). The external pipe length should not be more than 3 m.

Further information can be obtained from "BS 6798 Specification for installation of gas-fired boilers of rated input not exceeding 70 kW net".



### **Danger!**

**Risk of poisoning due to escaping flue gas!**  
**The connection of the condensate drain line to the waste water piping must not be fixed as the internal siphon could be sucked dry. Before the boiler is switched on the siphon must have been filled with water to prevent flue gas from leaking via the siphon (see Chap. 6.2.3).**

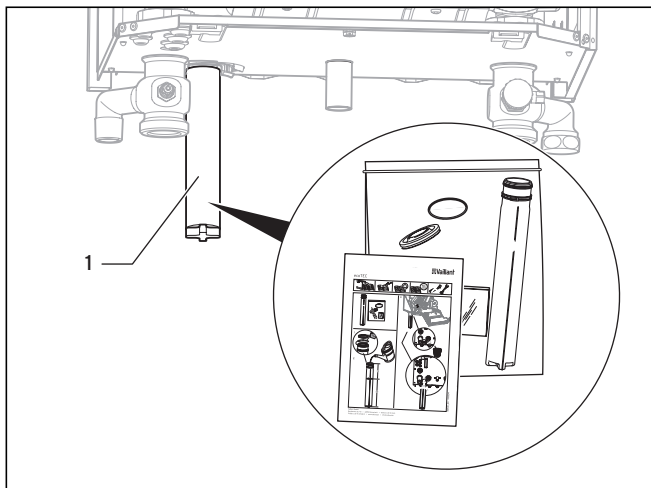


Fig. 5.13 Siphon cartridge



### **Danger!**

**Risk of poisoning due to escaping flue gas!**  
**You must fit the enclosed siphon cartridge (1) in accordance with the separate manual and fill it with water - see also Chap. 6.2.3.**

## 5.8 Electrical connection



### **Danger!**

**Risk of fatal electric shock through contact with live connections!**

**The electrical installation may only be carried out by a recognised skilled trade company. Always switch off the power supply first and ensure that it cannot be switched back on unintentionally. Only after this can the installation be undertaken. Mains connection terminals L and N remain live even if the boiler main switch is turned off!**

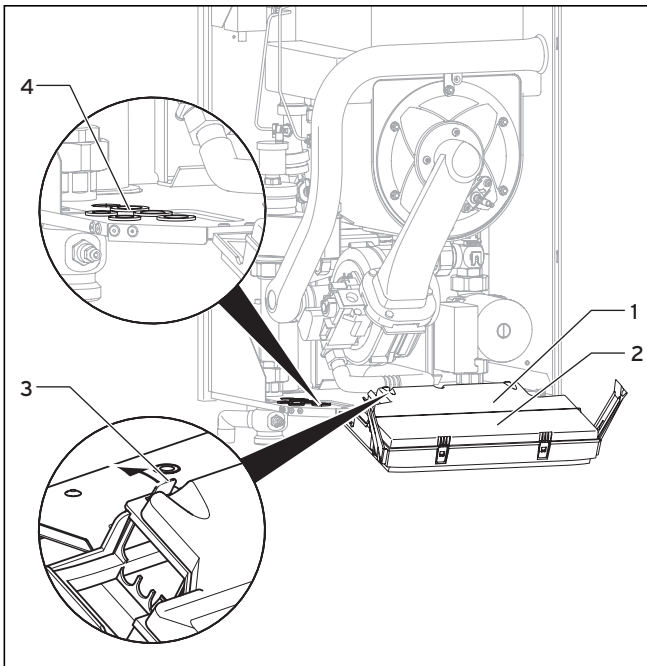
### 5.8.1 Mains connection

All electrical work shall be carried out by a heating engineer and shall comply with BS 7671 (IEE Regulations).

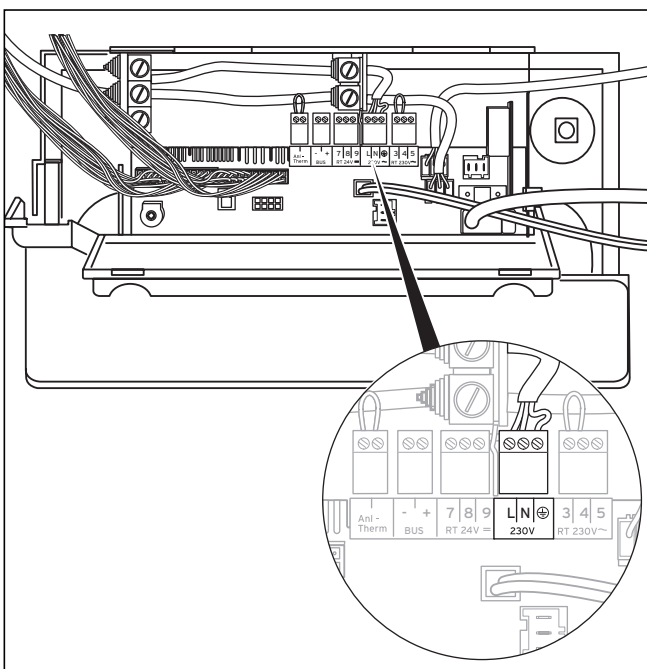
In the Republic of Ireland, reference should be made to the current edition of the ETCI (Electro-Technical Council for Ireland) rules.

The boiler is supplied for connection to 230 V, ~ 50 Hz supply fused at 3 A rating. Connection to the mains supply shall be made via a fused 3 pin plug to an unswitched shuttered socket, both complying with the requirements of BS 1363. (Alternatively, connection may be made via a 3 A fused double pole isolator having a contact separation of at least 3 mm in all poles and supplying the boiler and controllers only). The point of connection to the mains supply must allow complete electrical isolation of the boiler and its ancillary controllers. It should be readily accessible and adjacent to the boiler. A 3 core flexible cord according to BS 6500 tables 6,8 or 16 (3 x 0.75 to 3 x 1.5 mm<sup>2</sup>) should be used.

The nominal voltage of the mains must be 230 V; at mains voltages greater than 253 V and less than 190 V the functions may be impaired.



**Fig. 5.14** Opening back wall of the electronic box



**Fig. 5.15** Example for cable routing

- Cover the supply line over a length of approximately 2 - 3 cm and insulate the cores.



### Caution!

**Supplying power to the wrong plug terminals of the Pro E system can destroy the electronics. Only connect a 230 Vac live supply to boiler terminal connections marked LNE.**

- Connect the cores to the plug-in locations in the electronics (L, N and Earth), see Fig. 5.15, using the corresponding ProE plug.
- Close the rear cover of the electronic box until it audibly engages.
- Lift the electronic box up and press the two clips on the left and right of the box against the side casing of the boiler until they audibly engage.
- Mount the front casing (see Chap. 4.8).

### 5.8.2 Connecting controllers

Mount the controllers in accordance with the corresponding operating and installation manuals. The required connections to the electronic system of the boiler (e.g. for external controllers, external sensors etc.) should be performed as follows:

- Remove the front casing of the boiler (see Chap. 4.8) and tilt the electronic box (2) forwards (see Fig. 5.14).
- Unclip the rear cover (1) of the electronic box at the fastening points (3) and lift it up (see Fig. 5.14)
- Guide the supply lines of the relevant components to be connected through the cable ducts (4). Leave the existing seals in the other cable ducts, to seal the vacuum chamber.
- Then feed the mains supply lines into the electronic box and cut the lines to the correct length.
- Cover the supply line over a length of approximately 2 - 3 cm and insulate the cores.
- Connect the cores to the corresponding ProE plugs, or plug-in locations of the electronics, as shown in Fig. 5.15 (see connection diagram in Chap. 5.8.5).



### Caution!

**Danger of destroying the electronics! Do not connect a mains voltage supply to the following terminals: 7, 8, 9, eBUS (+,-)!**



### Note!

**Make sure that the electrical connections are carried out in accordance with standards and that they are mechanically secure.**

- Remove the front casing of the boiler (see Chap. 4.8) and tilt the electronic box (2) forwards.
- Unclip the rear cover (1) of the electronic box at the fastening points (3) and fold it up.
- Use a commercially available mains connection cable.
- Guide the mains connection cable through a cable duct (4). Use the grommet to seal the opening.
- Then feed the mains connection cable into the electronic box and cut the line to the correct length.

- If a roomthermostat/timer is not connected, you must insert a bridge between terminals 3 and 4, if not already installed. Remove the bridge if you connect a corresponding room/thermostat timer to terminals 3 and 4.

## 5 Installation

- If a weather-compensated or room temperature control system is connected (continuous control connection terminals 7, 8, 9) the bridge between terminal 3 and 4 must remain inserted.
- Close the rear cover of the electronic box until it audibly engages.
- Lift the electronic box up and press the two clips on the left and right of the box against the side casing of the boiler until they audibly engage.
- Mount the front casing (see Chap. 4.8).
- To access pump operating mode 1 (running on of pump) for multi-circuit controllers, change the setting at diagnosis point "d.18" (pump operating mode) from 3 "intermittent" to 1 "run on" (see Chap. 7.2.2).

Observe that the bridge at the ProE plug must be removed when connecting a maximum thermostat (flow thermostat) for underfloor heating.

### 5.8.3 Connecting a low loss header sensor

The low loss header sensor must either be connected to the X41/RF as per the connection diagram (Fig. 5.16) or to the selected controller (see corresponding operating manual).

### 5.8.4 Additional relay (grey plug on the PCB) and "2 in 7" multifunction module

#### Additional relay (grey plug on the PCB)

With the ecoTEC it is possible to actuate one additional component via the additional relay. You can select the installed components via diagnosis point "d.26" at diagnosis level 2 (see Chap. 9.1.2).

#### VR40 - "2 in 7" multifunction module

If you wish to connect additional components this can be done using the Vaillant VR40 - "2 in 7" multifunction module.

Carry out the installation in accordance with the corresponding operating and installation manual. To actuate relay 1 at the the accessory module select diagnosis point "d.27" at diagnosis level 2, and to actuate relay 2 select diagnosis point "d.28" (see Chap. 9.1.2). You can select the following components here:

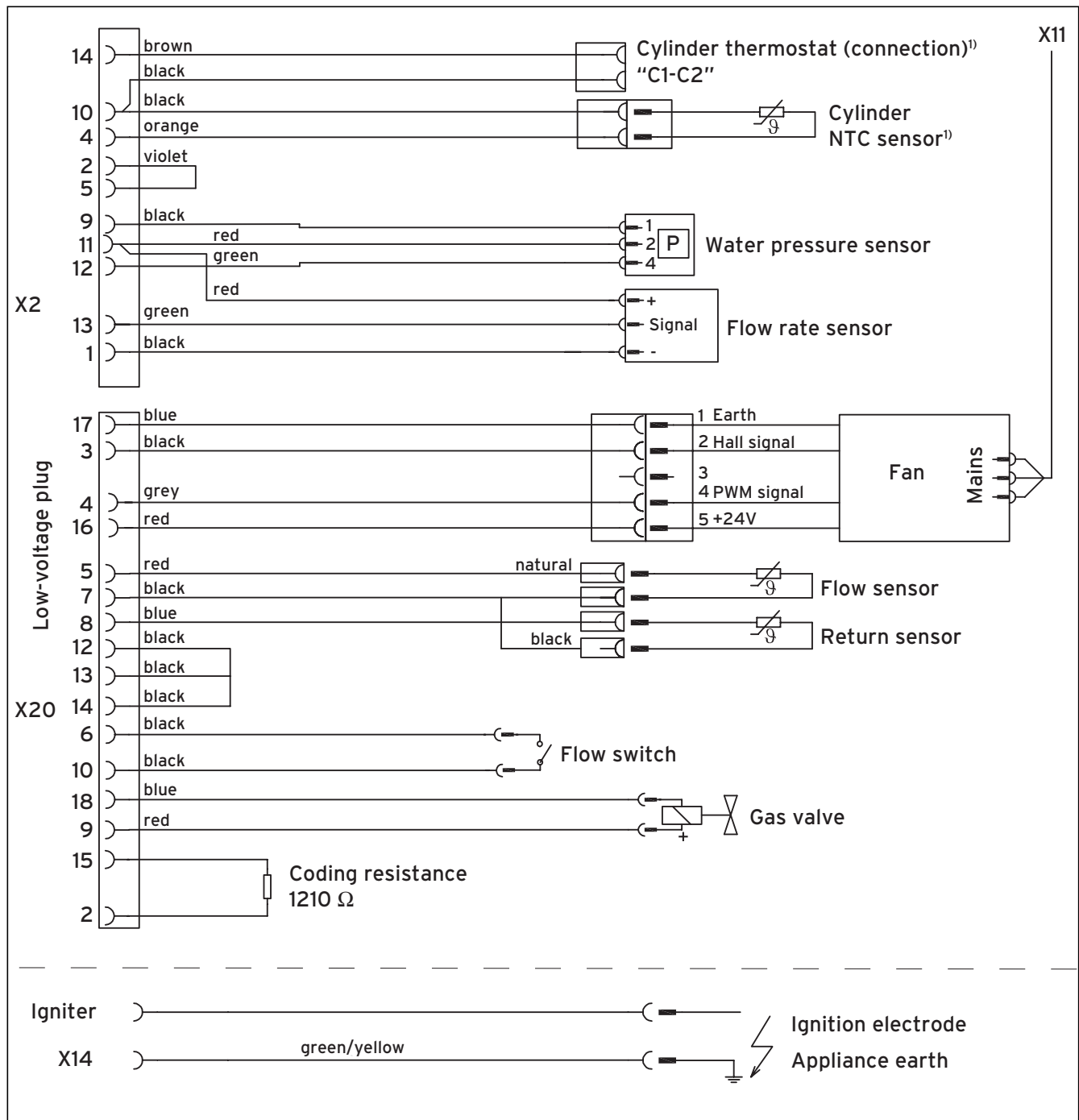
- 1 = circulation pump
- 2 = external pump
- 3 = charging pump
- 4 = vapour extraction hood
- 5 = external solenoid valve
- 6 = external error message
- 7 = not active
- 8 = remote control eBUS (not active)
- 9 = legionella pump (not active)



#### Note!

Please observe the separate manual attached to the VR40 - "2 in 7" multifunction module.

### 5.8.5 Connection diagrams



**Fig. 5.16 Connection diagram of ecoTEC**  
(continued on next page)

1) You must not use both the C1/C2 and the cylinder sensor connections!

## 5 Installation

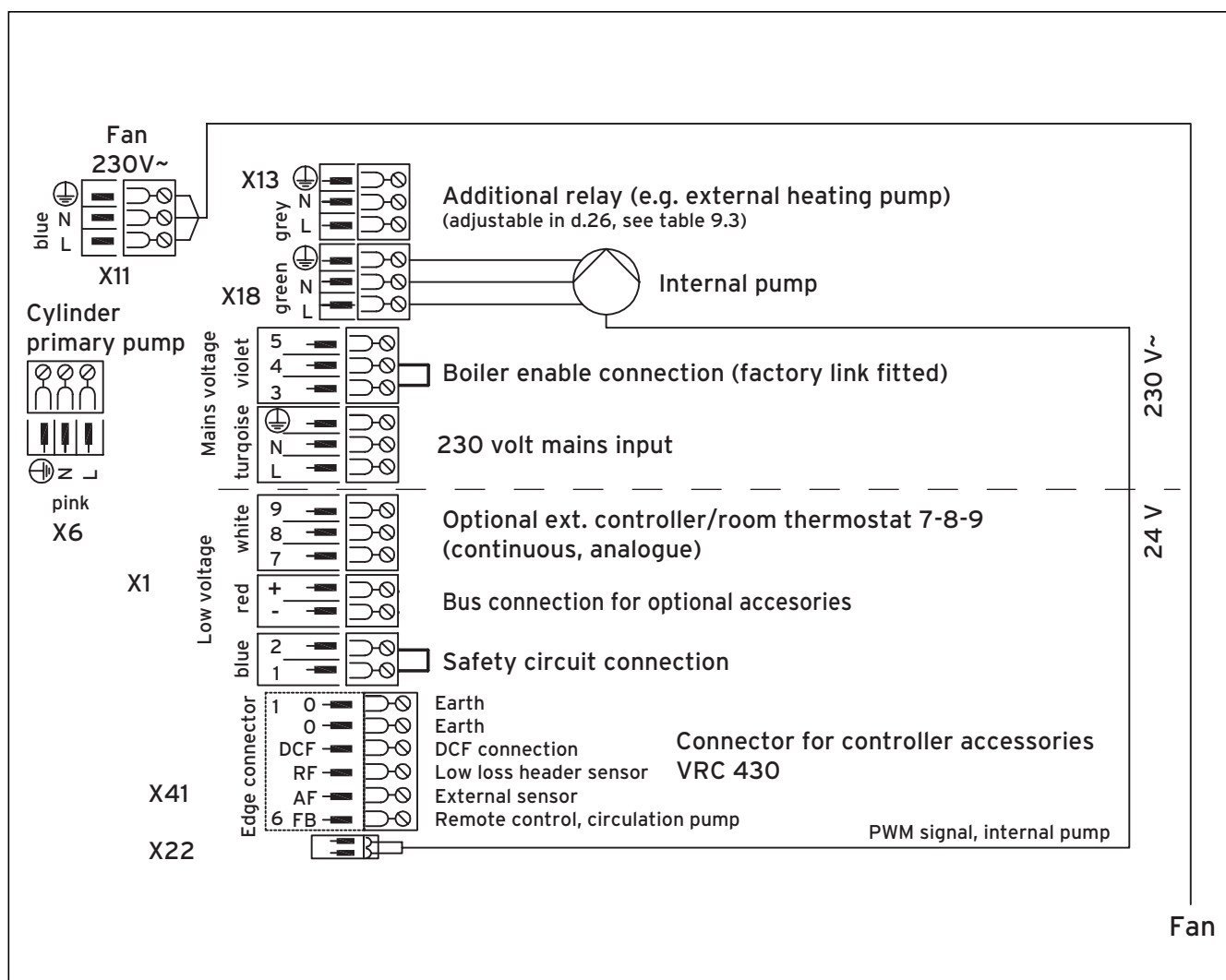


Fig. 5.16 Connection diagram of ecoTEC (continued)



## 6 Start-up



### Caution!

The boiler must only be operated with its casing properly and permanently closed! Otherwise, under unfavourable conditions, it can result in material damage or even injury or death.



### Note!

When starting up particularly take the following into consideration:

Before the heating circuit or charging circuit is filled you must open the cap on the automatic air vent which must remain open during subsequent operation.

Use the bleeding program to bleed the heating circuit or charging circuit (see Chap. 9.2).

### 6.1 Water circulation system

Detailed recommendations concerning the water circuit system can be taken from BS 6798 and BS 5449, Part 1 (for "Small Bore" and "Micro Bore" central heating systems). Lines which do not form part of the usable heating surface should be insulated to prevent heat losses and possible freezing up, especially where the lines run under rooves and ventilated cellar rooms. The drain connections must be easily-accessible, so that the entire system including the boiler and hot water system can be drained. The drain connections should be at least 1/2 " (BSP nominal size) and must be in accordance with BS 2879.

The boiler is suitable for Minibore and Microbore systems. Water lines are to be copper pipes in accordance with BS 2871, Part 1. All capillary connections in all the hot water lines must be carried out with lead-free solder. These must be thoroughly cleaned, especially when connecting a new boiler to an existing system.



### Caution!

To prevent deposition and severe damage to the boiler and heating system the cleaning agent must be applied carefully and subsequently removed from the heating system by draining it completely. Cleaning agents should not remain in the heating system longer than 24 hours.

This cleaning process must take place before a new boiler is fitted in accordance with BS 7593.

Recommendations on the use of system cleaning agents can be obtained from Sentinel, Betz Dearborn Ltd. Widnes, Cheshire, WA8 8UD, Tel. 0151 420 9595, or Fernox, Cookson Electronics, Forsyth Road, Sheerwater, Woking, Surrey GU21 5RZ, Tel. 01483 793200.

## 6.2 Filling the system

### 6.2.1 Preparation of heating water



### Caution!

Do not add anti-freeze to the system water! Addition of such can attack the boiler seals and ultimately result in damage to the boiler and cause noise during the heating operation. Vaillant assumes no liability for this and such consequential damages. Please ensure the operator is aware of frost protection methods.

### 6.2.2 Filling and bleeding from the heating side

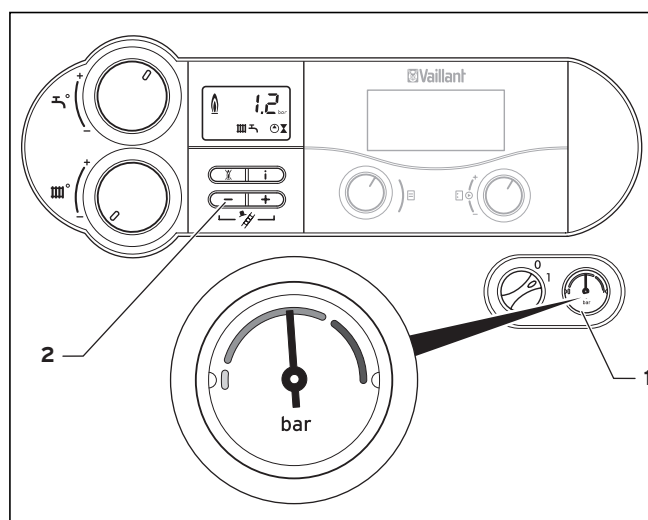


Fig. 6.1 Check the filling pressure of the heating system



### Caution!

Fill the system in accordance with standards, and only via the combined filling and emptying valve on the boiler's return connection. Otherwise, problems with bleeding the boiler may occur!



### Note!

The ecoTEC is equipped with a pressure gauge (1) and a digital pressure indicator. You can display the precise filling pressure when the boiler is switched on by pushing the "-" button (2). You can also switch between the continuous display of temperature or pressure by keeping the "-" button pushed for about 5 seconds.

For the heating installation to work properly the indicator on the pressure gauge (1) must be in the upper half of the dark grey area when the system is cold (see Fig. 6.1). This corresponds to a filling pressure between 1.0 and 2.0 bar.

## 6 Start-up

If the heating installation serves several floors, the values for the water pressure in the system may need to be higher (to avoid the ingress of air).

- Flush through the heating system thoroughly before actually filling it.

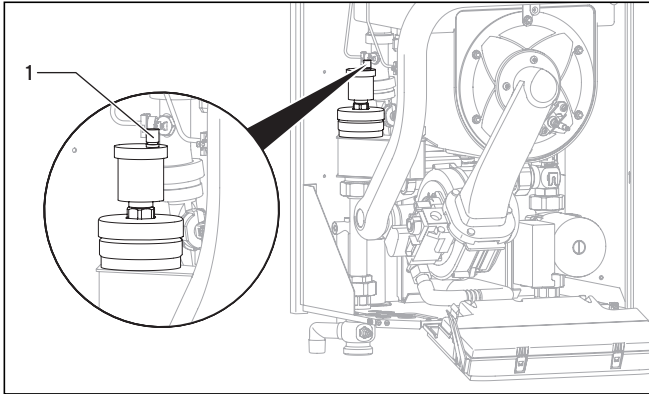


Fig. 6.2 Automatic air vent

- Unfasten the cap on the automatic air vent (1) by one or two turns (the appliance is bled automatically while continuously operated via the automatic air vent).
- Open all thermostatic radiator valve in the installation.
- Connect the system's combined filling and emptying valve to a cold water draw-off valve in accordance with the standards.

### Note!

To avoid damaging the appliance through operation with insufficient water pressure, the boiler is equipped with a pressure sensor. The sensor records a lack of pressure if the pressure value falls below 0.6 bar and the detected pressure value flashes in the display. If the pressure falls below 0.3 bar the boiler switches off. Error message F.22 ("water shortage") appears in the display. Fill the system up with water before you start up the boiler again. This message also appears if you switch the boiler on when it is empty and disappears automatically when it is filled.



### Caution!

**Risk of damage from leaking water!**  
If the pressure drops frequently the reason for the loss of heating water must be identified and eliminated.

- Open the combined filling and emptying valve and the draw-off valve slowly and add water until the required system pressure is shown on the pressure gauge/display.
- Turn the tap off.



### Note!

Use the test program P.O to bleed the heating system: The boiler does not start up. The internal pump runs intermittently and bleeds the appliance circuit. The pressure is displayed digitally. Ensure that the system pressure does not fall below 0.8 bar when bleeding is in progress. Otherwise the bleeding will not be carried out properly. The bleeding program takes about 6.5 minutes to complete.

- Bleed all the radiators.
- Check the system pressure again.



### Caution!

If too much air is still in the system after the bleeding program is finished it must be started again! Once the filling procedure is complete the system pressure should be at least 0.2 bar above the back-pressure from the expansion vessel ( $P_{\text{system}} \geq P_{\text{ADG}} + 0.2 \text{ bar}$ ).

- Check all connections for leaks.



### Note!

When the boiler starts operating a maintenance or error message may occur due to falling system pressure. The message disappears automatically when the boiler is refilled.

### 6.2.3 Filling the condensate siphon

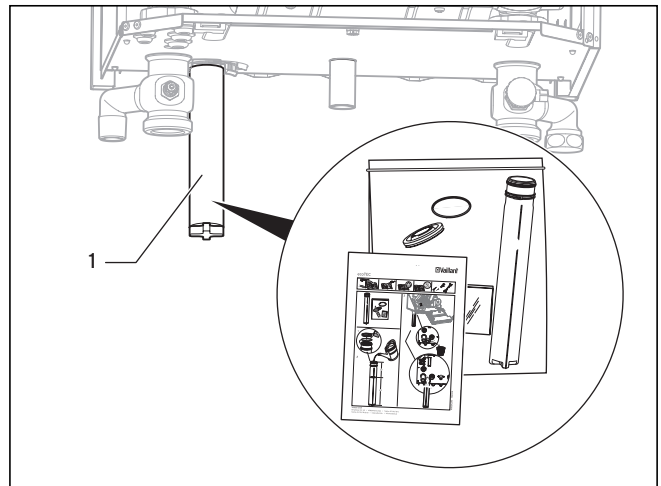


Fig. 6.3 Filling the condensate siphon

A siphon cartridge (1) is included with the boiler as an installation kit.

- Fit the siphon cartridge (1) in accordance with the accompanying installation manual before filling the condensate siphon.

**Note!**

If the installation kit is not present, do not operate the boiler. Contact Vaillant customer service.

**Danger!**

If the boiler is operated with an empty condensate siphon, there is danger of poisoning through escaping flue gases. Therefore it is mandatory to fill the siphon in accordance with the accompanying description before start-up.

### 6.3 Checking the gas setting

**Caution!**

**Malfunctions or reduction in working life of the boiler!**

If the boiler version does not correspond to the local gas family, there will be malfunctions or you have to change components of the boiler ahead of schedule, e. g. do not use a LPG boiler on natural gas.

- Before starting up the boiler compare the details of the type of gas specified on the identification plate with the type of gas supplied at the installation site.

If the boiler version corresponds to the local gas family:

- Proceed as described below.

If the boiler version does not correspond to the local gas family:

- Perform the gas conversion in accordance with the gas conversion kit 0020010641.
- Adjust the gas setting as described below (see sections 6.3.1 to 6.3.3).

The combustion of this boiler has been checked, adjusted and preset at the factory for operation on the type of gas defined on the identification plate. No measurement of the combustion is necessary to set up the boiler.

- Do not adjust the multifunctional automatic gas valve.
- Ensure
  - that the boiler has been installed in accordance with these instructions,
  - the integrity of the flue system and the flue seals, as described in the flue installation instructions enclosed with this boiler, and as described below,
  - a visual check is carried out on the boiler combustion circuit and the relevant seals,
  - that any defects have been corrected at this stage.

To further validate the integrity of the flue system and confirm correct operation of the boiler it is possible to conduct flue gas and air measurements on this boiler - for details see section 6.3.1.

Proceed to put the boiler into operation as follows:

- Check the maximum gas flow rate as detailed in section 6.3.2.
- Check the gas inlet working pressure as detailed in section 6.3.3.
- Note that you must re-measure the gas flow rate or the gas inlet working pressure, if changes were required to correct any issues found.

#### 6.3.1 Checking for tightness of the flue gas installation and flue gas recirculation

- Check the integrity off the flue gas installation according to TB 200.
- Should the flue gas installation be longer than 2 m we strongly recommend to check the system for flue gas recirculation as described below.

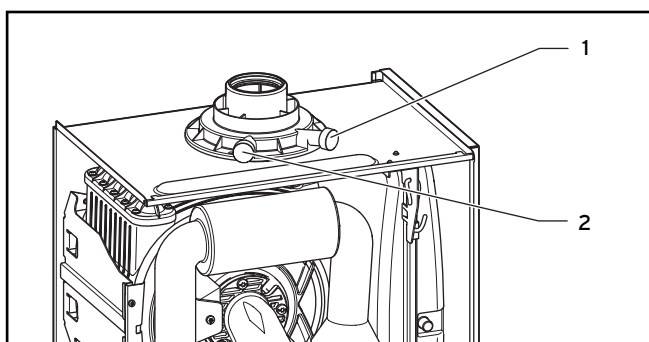


Fig. 6.4 Flue gas measure points

**Legend:**

- 1 Flue gas measure point
- 2 Air measure point

- For checking the system for recirculation use the air measure point **(2)**.
- Use the flue gas analyser.
- If you detect any CO or CO<sub>2</sub> in the fresh air, search for the flue gas leakage or recirculation.
- Correct the defects.
- Check again as described before, if there is any CO or CO<sub>2</sub> in the fresh air.
- If you cannot correct the defects you must not start up the boiler.

## 6 Start-up

### 6.3.2 Checking the gas flow rate

The boiler is fitted with a multifunctional automatic gas valve which ensures that the precise air/gas ratio is provided under all operating conditions. The gas flow rate has been set during production and does not require adjustment. With the front casing fitted check the gas flow rate of the boiler as follows:

- Start the boiler by activating the test program P.1 as described in section 9.2.
- In addition, ensure that maximum heat can be dissipated into the heating system by turning up the room thermostat.
- Wait at least 5 minutes until the boiler has reached its operating temperature.
- Ensure that all other gas appliances in the property are turned off.
- Measure the gas flow rate at the gas meter.
- Check that the gas flow rate is as stated in Table 6.1.

Appliance	ecoTEC VU 656		
Maximum net heat input in kW	65		
Gas flow rate	nom.	+ 5 %	- 10 %
Natural gas in m <sup>3</sup> /h	6,9	7,25	6,2

**Table 6.1 Gas flow rate**

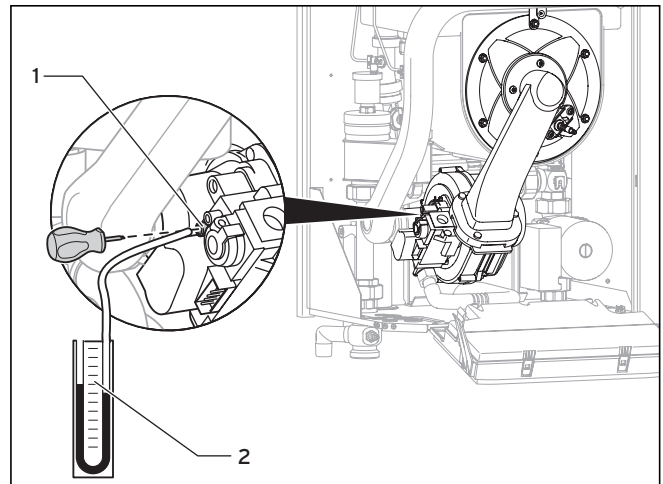
- If the measured gas flow rate lies outside the tolerance limits specified in Table 6.1, do not operate the boiler and inform the Vaillant Service Solutions (0870 6060 777).

If the measured gas flow rate is within the tolerance limits shown in Table 6.1, then proceed as follows:

- Take the boiler out of operation by
  - Pressing the + and i buttons simultaneously and turn down both thermostat control knobs.
- Record the boiler maximum gas flow rate onto the Benchmark gas boiler commissioning checklist.

### 6.3.3 Checking the gas inlet working pressure

- Ensure that the gas inlet working pressure can be obtained with all other gas appliances in the property working.
- Remove the front casing from the boiler.
- Close the gas isolation valve of the boiler.



**Fig. 6.5 Measuring the gas inlet working pressure**

- Loosen the sealing screw marked "in" (1) on the gas valve.
- Connect a digital pressure gauge or U-tube manometer (2).
- Open the gas isolation valve of the boiler.
- Start the boiler by activating the test program P.1 as described in section 9.2.
- In addition, ensure that maximum heat can be dissipated into the heating system by turning up the room thermostat.
- With the boiler operating at full load check that the gas inlet working pressure at the reference test point (1) complies with the requirements of Table 6.2.

Natural gas (G20)	
Minimum pressure at reference test point in mbar	Maximum pressure at reference test point in mbar
17	25

**Table 6.2 Gas inlet working pressure at the reference test point**

- Should the pressure recorded at the reference test point in the boiler be lower than indicated (Table 6.2) check if there is any blockage in the pipework or if the pipework is undersized.
- If the supply pressure is out of tolerance contact your Emergency Service Provider.

If the gas inlet working pressure at the reference test point (1) is **not** within the permissible range and you cannot correct the failure, notify the gas supply company or the Vaillant Service Solutions team and proceed as follows:

- Take the boiler out of operation by
  - Pressing the + and i buttons simultaneously and turn down both thermostat control knobs.
- Close the gas isolation valve of the boiler.

- Remove the pressure gauge and re-tighten the sealing screw (1).
- Turn on gas at the gas isolation valve.
- Make sure that there is no leakage at the sealing screw.
- Turn off gas at the gas isolation valve.
- Put the front casing back on.
- Turn off electrical supply to the boiler.
- You must not start up the boiler.

If the gas inlet working pressure is within the permissible range, proceed as follows:

- Take the boiler out of operation by
  - Pressing the + and i buttons simultaneously and turn down both thermostat control knobs.
- Close the gas isolation valve of the boiler.
- Remove the pressure gauge and re-tighten the sealing screw (1).
- Open the gas isolation valve of the boiler.
- Make sure that there is no leakage at the sealing screw.
- Put the front casing back on.
- Reset boiler controls for normal operation.
- Record the appliance gas inlet working pressure (mbar) in the Benchmark gas boiler commissioning checklist.

## 6.4 Checking the appliance function

If the installation is complete and the gas setting has been checked, perform a function check before starting up the boiler and handing it over to the operator.

- Commission the boiler in accordance with the instructions in the relevant operating manual.
- Check the tightness of the gas supply line, flue gas installation, heating installation and hot water pipes.
- Check the flue pipe for proper installation.
- Make absolutely sure that the front casing is properly closed.
- Check the function of the heating (see Chap. 6.4.1) and hot water generation (see Chap. 6.4.2)
- Hand over the boiler to the user.

The Vaillant ecoTEC displays status codes to indicate the operating condition of the boiler. You can perform a function check based on these status codes by pressing the "i" button.

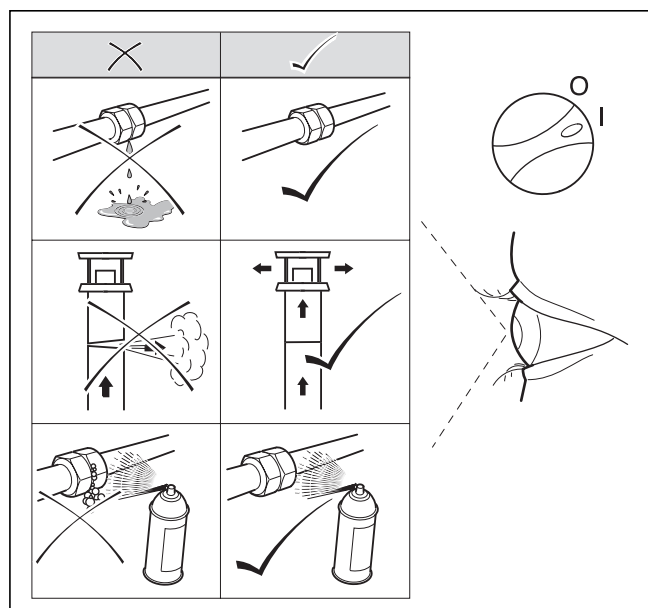


Fig. 6.6 Tightness check

### 6.4.1 Heating

- Switch on the boiler.
- Make sure that heat is being requested.
- Push "i" to activate the status indicator.

As soon as there is a heat demand, the boiler goes through the status displays "S. 1" to "S. 3", until the boiler is running properly in normal operation and the display "S. 4" appears.

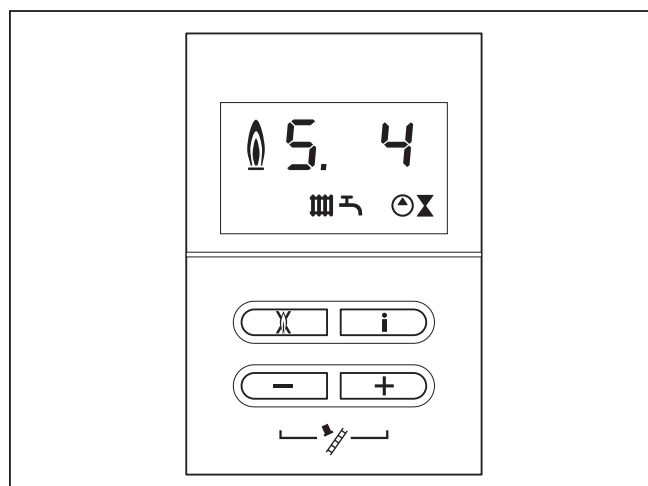


Fig. 6.7 Display during heating mode

## 6 Start-up

### 6.4.2 Cylinder charging

- Switch on the boiler and the connected hot water cylinder.
- Make sure that the cylinder thermostat is requesting heat.
- Push the "i" button.

If the cylinder is correctly charged the boiler runs through the status displays "S. 20" to "S. 23", until the boiler is running properly in normal operation and the display "S. 24" appears.



#### Note!

If you connect your controller to a dual-cable eBUS line, specify the highest possible hot water temperature using the corresponding rotary knob. Specify the set target temperature for your cylinder at the controller.

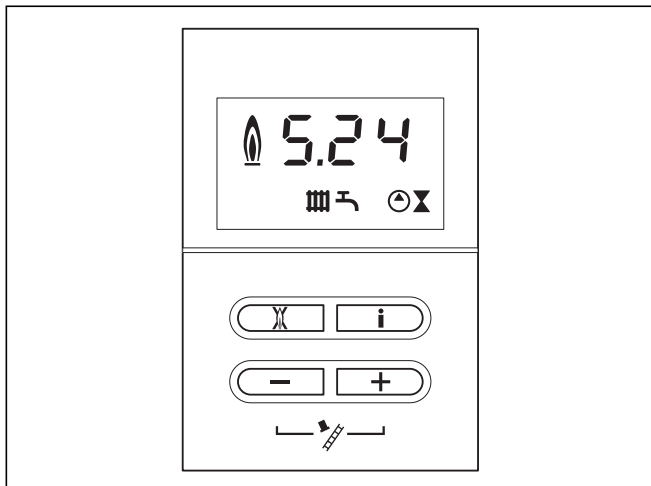


Fig. 6.8 Display in charging mode

### 6.5 Handing over the control to the owner



#### Note!

Once the installation is complete, please affix the enclosed sticker (Item No. 835 593) containing the language used by the operator to the boiler.

The operator must be instructed in handling and functions of the ecoTEC boiler.

- Hand over any instruction manuals intended for the user, as well as the appliance documents for safe keeping.
- Read through the operating manual with the owner and answer any questions.
- Draw special attention to the safety instructions which the owner must follow.
- Make the operator aware of the need for regular inspection and maintenance of the system.
- Make the operator aware of the need to keep the manuals in a handy location near the ecoTEC, but not in or on the boiler.

- Instruct the user about measures taken to ensure the supply of combustion air and removal of flue gas. Point out that these measures, particularly, must not be altered.
- Explain to the operator how to check the water level/filling pressure of the system and show the operator how to refill and bleed the heating system when the need arises.
- Show the user the correct (economical) temperature, controller and thermostat valve settings.



#### Caution!

The boiler may only be operated with its casing properly and permanently closed! Otherwise, under unfavourable conditions, it can result in material damage or even injury or death.

### 6.6 Vaillant warranty

Vaillant provide a full parts and labour warranty for this boiler.

The boiler must be installed by a suitably heating engineer in accordance with the Gas Safety (Installation and Use) Regulations 1998, and the manufacturer's instructions. In the UK 'CORGI' registered installers undertake the work in compliance with safe and satisfactory standards.

All unvented domestic hot water cylinders must be installed by a heating engineer to the prevailing building regulations at the time of installation (G3).

Terms and conditions apply to the warranty, details of which can be found on the warranty registration card included with this appliance.

Failure to install and commission this appliance in compliance with the manufacturer's instructions may invalidate the warranty (this does not affect the customer's statutory rights).



## 7 Adapting the boiler to the heating system

The ecoTEC boilers are equipped with a Digital Information and Analysis system (DIA system).

### 7.1 Selection and setting of parameters

In the diagnosis mode, you can change various parameters to match the boiler to the heating system.

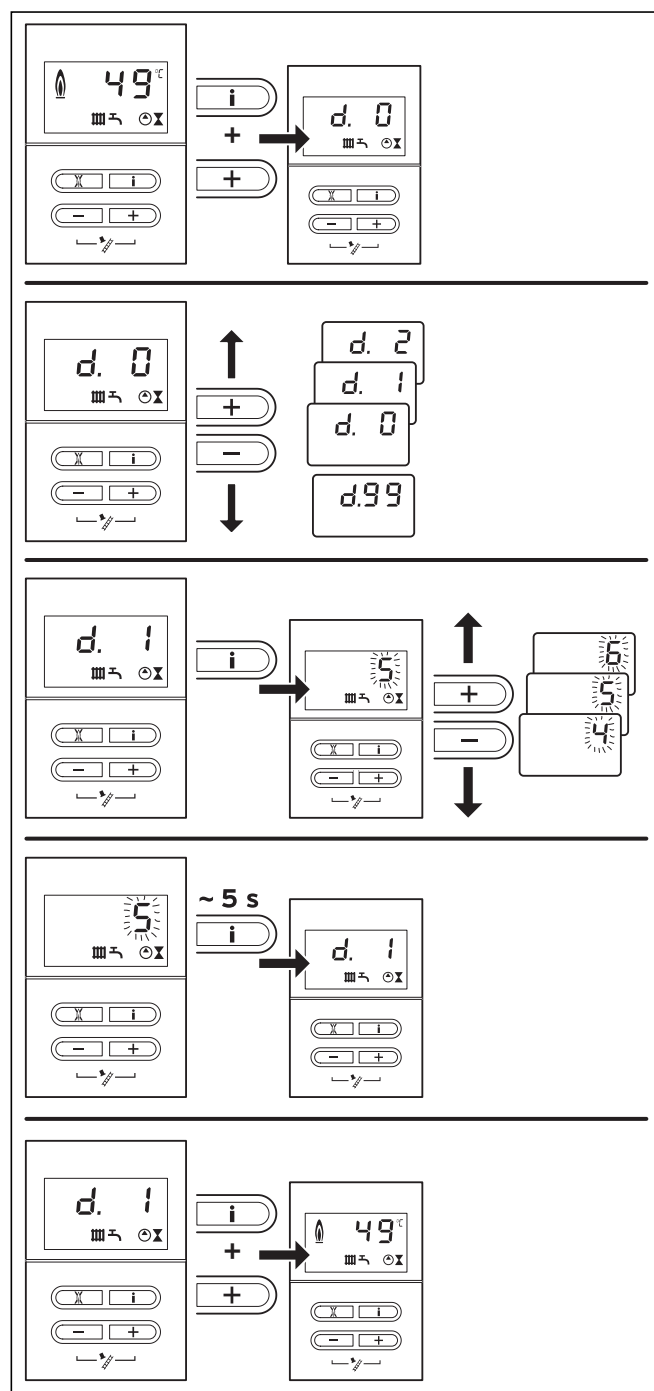


Fig. 7.1. Setting the parameters

Table 7.1 shows only those diagnosis points where modifications are possible. All the other diagnosis points are only required for diagnostics and fault repair (see Chap. 9).

Using the following description you can select the relevant parameters:

- Push the "i" and "+" buttons simultaneously.

The display shows "d. 0".

- Scroll to the desired diagnosis number with the "+" or "-" buttons.

- Push the "i" button.

The display shows the respective diagnosis information.

- If necessary, use the "+" or "-" keys to change the value (display flashes).
  - Save the new value by holding the "i" button pressed for about 5 seconds until the display stops flashing.
- You can finish the diagnosis mode as follows:
- Push the "i" and "+" buttons simultaneously or avoid pressing any buttons for about 4 minutes.

The current heating flow temperature, or installation pressure (if option is selected), reappears in the display.

### 7.2 Overview of adjustable system parameters

The following parameters can be set to match the boiler to the heating system and to suit the customers requirements:



#### Note!

The diagnosis points are divided into two diagnosis levels.

- Diagnosis level 1 for the operator
  - Diagnosis level 2 for the heating engineer
- Use the relevant tables; see Chap. 9.1.2.

#### Note!

If you select diagnosis level 2, all the diagnosis points are available to you.

Selecting diagnosis level 2:

- Scroll as described above in the 1<sup>st</sup> diagnosis level to diagnosis number "d.97".
- Change the displayed value to **17** (password) and save this value. You are now in the 2<sup>nd</sup> diagnosis level.

## 7 Adapting the boiler to the heating system

Display	Meaning	Adjustable parameters	Factory setting	Boiler-specific setting
d. 0	Heating partial load	14 - 65 kW	46 kW	
d. 1	Overrun time of internal pump for heating mode	2 - 60 min	5 min	
d. 2	Maximum blocking time heating at 20°C flow temperature	2 - 60 min	20 min	
d.14	Pump speed target value	Target value of internal pump in %: 0 = auto, 1 = 53, 2 = 60, 3 = 70, 4 = 85, 5 = 100	5 (100)	
d.17	Heating flow/return regulation changeover	0 = flow, 1 = return	0	do not adjust
d.18	Specification of the pump operating mode	0 = overrun, 1 = run on, 2 = winter, 3 = intermittent	3	
d.20	Maximum setting for cylinder target value	40 to 70 °C	65 °C	
d.26	Additional relay control ecoTEC	1 = circulation pump 2 = ext. Pump 3 = charging pump 4 = vapour extraction hood 5 = ext. solenoid valve 6 = ext. error message 7 = not active 8 = remote control, eBUS (not yet supported) 9 = legionella pump (not active)	2	
d.27	Switch of relay 1 on the multifunction module "2 in 7"	1 = circulation pump 2 = ext. Pump 3 = charging pump 4 = vapour extraction hood 5 = ext. solenoid valve 6 = ext. error message 7 = not active 8 = remote control, eBUS (not yet supported) 9 = legionella pump (not active)	1	
d.28	Switch of relay 2 on the multifunction module "2 in 7"	1 = circulation pump 2 = ext. Pump 3 = charging pump 4 = vapour extraction hood 5 = ext. solenoid valve 6 = ext. error message 7 = not active 8 = remote control, eBUS (not yet supported) 9 = legionella pump (not active)	2	
d.50	Offset for minimum speed	in rpm/10, adjustment range: 0 to 300	30	
d.51	Offset for maximum speed	in rpm/10, adjustment range: -99 to 0	-45	
d.71	Target value maximum heating flow temperature	40 to 85 °C	75 °C	
d.72	Pump overrun time after cylinder charging	0 - 600 s	80 s	
d.75	maximum charging time for hot water cylinder without independent control system	20 - 90 min	45 min	
d.77	Limitation of cylinder charging output in kW	such as heating partial load	65 kW	
d.78	Limitation of charging temperature in °C	55 - 85 °C	80 °C	
d.84	Maintenance indicator: Number of hours until the next maintenance	0 to 3000 h and "-" (300 corresponds to 3000 h, "-" = deactivated)	"-"	
d.93	DSN appliance variant setting	Setting range: 0 to 99	47 = VU 656/4	
d.96	Factory setting	1 = Resetting adjustable parameters to factory setting		
d.97	Activation of the 2 <sup>nd</sup> diagnosis level	Code: 17 for level 2		

**Table 7.1 Adjustable parameters, levels 1 and 2**



### 7.2.1 Setting the heating partial load

The output of the boilers is set at 35 kW in the factory. You can specify a value that corresponds to the kW output of the boiler under diagnosis point "d. 0".

### 7.2.2 Setting of pump overrun and pump operating mode

The pump overrun time for the heating operation is set at the factory to a value of 5 minutes. It can be adjusted through a range of 2 - 60 minutes under diagnosis point "d. 1". Under diagnosis point "d.18", you can set the overrun behaviour of the pump to a different mode.

**Overrun:** Once the heating requirement has ended, the pump runs on for the time specified under "d. 1".

**Run on:** The pump is switched on if the rotary knob for setting the heating flow temperature is not at the left-hand stop and the heat requirement is enabled by an external controller.

**Intermittent:** This pump operating mode is useful for removing residual heat after charging when the heat demand is extremely low and large temperature differences exist between the charging and heating mode target values. This avoids underheating of the living spaces. In the event of a heat demand the pump is switched on every 25 minutes for 5 minutes once the overrun time has elapsed.

### 7.2.3 Setting of maximum flow temperature

The maximum flow temperature for the heating is set at the factory to 75 °C. Under diagnosis point "d.71" it can be set to between 40 and 85 °C.

### 7.2.4 Setting of burner blocking time

To prevent frequent switching on and off of the burner (energy loss), an electronic restart lockout is activated for a specific period each time the burner is switched off. The burner locking time can be modified to suit the conditions of the heating installation.

The burner blocking time is only activated for the heating operation.

Hot water operation during a burner blocking time does not affect the timer. The maximum burner locking time can be set to a value of between 2 and 60 min under diagnosis point d.2 (factory setting: 20 min). The individual effective blocking time is calculated from the current target flow temperature and the set maximum burner blocking time.

The timer can be reset or cancelled by pressing the fault clearance key and also by activating summer mode for a short time (by briefly turning the nominal flow potentiometer to the left-hand stop then back to the starting position). The remaining burner locking time following a regular shutdown in heating mode can be called up under diagnosis point "d.67".

## 7 Adapting the boiler to the heating system

T <sub>Flow</sub> (target) [°C]	Set maximum burner blocking time [min]												
	1	5	10	15	20	25	30	35	40	45	50	55	60
20	2,0	5,0	10,0	15,0	20,0	25,0	30,0	35,0	40,0	45,0	50,0	55,0	60,0
25	2,0	4,5	9,2	14,0	18,5	23,0	27,5	32,0	36,5	41,0	45,0	50,0	54,5
30	2,0	4,0	8,5	12,5	16,5	20,5	25,0	29,0	33,0	37,0	41,0	45,0	49,5
35	2,0	4,0	7,5	11,0	15,0	18,5	22,0	25,5	29,5	33,0	36,5	40,5	44,0
40	2,0	3,5	6,5	10,0	13,0	16,5	19,5	22,5	26,0	29,0	32,0	35,5	38,5
45	2,0	3,0	6,0	8,5	11,5	14,0	17,0	19,5	22,5	25,0	27,5	30,5	33,0
50	2,0	3,0	5,0	7,5	9,5	12,0	14,0	16,5	18,5	21,0	23,5	25,5	28,0
55	2,0	2,5	4,5	6,0	8,0	10,0	11,5	13,5	15,0	17,0	19,0	20,5	22,5
60	2,0	2,0	3,5	5,0	6,0	7,5	9,0	10,5	11,5	13,0	14,5	15,5	17,0
65	2,0	1,5	2,5	3,5	4,5	5,5	6,5	7,0	8,0	9,0	10,0	11,0	11,5
70	2,0	1,5	2,0	2,5	2,5	3,0	3,5	4,0	4,5	5,0	5,5	6,0	6,5
75	2,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0

**Table 7.2 Effective burner blocking times**

The effective burner locking times for each case depending on the set target flow temperature and the maximum specified burner locking time can be taken from Table 7.2.



### **Note!**

**After the set number of hours has elapsed, the service interval must be entered in the diagnosis mode again.**

### **7.2.5 Determination of maintenance interval/maintenance display**

The ecoTEC electronics incorporate a feature that enables you to determine the maintenance intervals for the boiler. This function serves to provide a signal after a specific, adjustable, number of burner operating hours that the boiler needs to be maintained.

The service signal SEr and the current flow temperature are shown alternately in the display of the ecoTEC once the specified number of burner operating hours has elapsed. The "maintenance" message appears in the display of the eBUS controller (accessories).

Heat demand	Number of persons	Burner operating hours to the next inspection/maintenance (dependent upon the system type)
15 kW	2 - 3	1.800 h
	3 - 4	1.800 h
20 kW	3 - 4	2.500 h
	4 - 5	2.500 h
25 kW	3 - 4	2.600 h
	4 - 6	2.600 h
> 27 kW	3 - 4	3.000 h
	4 - 6	3.000 h

**Table 7.3 Guide values for operating hours**

The number of operating hours up to the next maintenance can be set under the diagnosis point "d.84". Guide values can be taken from Table 7.3; these values comply with an approximate operating time of one year for the appliance.

The operating hours can be set in steps of ten from 0 to 3000 h.

If the symbol "-" is entered at diagnosis point "d.84" instead of a numerical value, the "maintenance display" function is deactivated.

## 8 Inspection and maintenance

### 8.1 Inspection and maintenance intervals



#### **Danger!**

**Risk of injury and risk of damage to property due to neglected inspection and maintenance! Neglected inspection and maintenance works or not observing the stated inspection and maintenance intervals can interfere with the operational safety of the boiler and can result in damage to property and to persons.**

- **Point out to the operator that he must observe the demanded inspection and maintenance intervals as a minimum.**
- **Carry out proper regular inspections once a year.**
- **Carry out regular maintenance as dictated by findings during the inspection process. The frequency of maintenance must not be longer than every 5 years.**

#### **Danger!**

**Danger of life and limb due to improper inspection/maintenance!**

**Inspections/Maintenance work carried out improperly can result in leakages and explosion.**

- **The boiler may only be inspected/maintained by a competent person.**

All service work must be carried out by a competent person in accordance with the Gas safety, installation and use regulations. In the UK this is considered to be a person approved at the time by the Health and Safety Executive.

In addition BS 6798: 2009 "Specification for installation and maintenance of gas-fired boilers of rated input not exceeding 70 kW net" advises that:

- The person carrying out a combustion measurement must be assessed as competent in the use of a flue gas analyser and the interpretation of the results.
- The flue gas analyser used must be one meeting the requirements of BS7927 or BS-EN50379-3 and be calibrated in accordance with the analyser manufacturers' requirements.
- Competence can be demonstrated by satisfactory completion of the relevant ACS standard assessment, which covers the use of electronic portable flue gas analysers' in accordance with BS 7967, parts 1 to 4.
- The flue gas analyser is set to the correct fuel setting.

We recommend the conclusion of an inspection and maintenance contract with an approved company or installer. The inspection serves to determine the actual condition of the respective boiler and compare it with the specified condition. This is done by measuring, checking and observing. Maintenance is required in order to eliminate any deviations of the actual condition from the specified condition.

This normally is done by cleaning, adjustment and, if necessary, replacing individual components that are subject to wear.

You must carry out an annual inspection of the Vaillant ecoTEC.

It is possible to perform a quick, accurate inspection without removing components by requesting data from the DIA system, carrying out the simple visual checks indicated in Table 8.2 and performing a flue gas measurement.

The maintenance intervals (at least once every 5 years) and their scope are determined by the heating engineer based on the condition of the boiler found during the inspection.

All inspection and maintenance work should be performed in the order specified in Table 8.2.



#### **Danger!**

**Possible poisoning and burning by escaping hot flue gases!**

**It is possible that hot flue gases escape and could result in poisoning or burning, if the boiler is operated**

- **without a completely installed air/flue gas duct**
- **with an opened air/flue gas duct**
- **with internal leakages and an opened front casing.**
- **Operate the boiler**
  - **for commissioning**
  - **for testing purposes**
  - **in continuous mode**

**only with closed front casing and completely mounted and closed air/flue gas duct.**

### 8.1.1 General inspection and maintenance instructions

To ensure the faultless operation, long term availability of all functions and long working life of your Vaillant boiler and to prevent modifications to the approved series status only genuine Vaillant spare parts must be used when carrying out inspection, maintenance and repair work.

For an overview of the available original Vaillant spare parts, contact the Vaillant sales office on 01634 292310.

During any inspection and maintenance or after change of parts of the combustion circuit, the following must be checked:

- The appliance has been installed in accordance with the relevant installation instructions.
- The integrity of the flue gas installation and flue seals is in accordance with the relevant flue installation instructions enclosed.
- Visual, the integrity of the boiler combustion circuit and relevant seals.

## 8 Inspection and maintenance

- The gas inlet working pressure at maximum rate as described in section 6.3.3.
  - The gas flow rates as described in section 6.3.2.
  - Correctness of electrical, water and gas connections.
  - Correctness of the water pressure.
  - The condition of the whole system, in particular the condition of radiator valves, evidence of leakage from the heating system and dripping taps.
- Correct any faults before proceeding.

### 8.1.2 Safety instructions



#### **Danger!**

**Danger of life and limb by electric shock!**

**The supply terminals of the boiler are under mains voltage even if the boiler main switch is off.**

- **Do not touch the supply terminals.**
- **Protect the electronic box from any water or spray.**
- **Before working on the boiler, turn off the power and secure against restart.**



#### **Note**

**If it is necessary to keep the electricity to the boiler switched on for certain inspection and maintenance, this is indicated in the description of the maintenance task.**

Always perform the following steps **prior** to inspection or maintenance work:

- Switch off the main switch.
- Disconnect the boiler from the power mains by
  - disconnecting the mains plug or
  - de-energising the boiler via an isolating device with a contact opening of at least 3 mm (e. g. fuses or power switches).
- Further check for electrical isolation of the appliance by use of a test meter.
- Close the gas isolation valve.
- Close the service valves in the heating flow and return.
- Remove the front casing from the boiler.
- When removing any water carrying components ensure that water is kept away from all electrical components.

Always perform the following steps after performing any inspection or maintenance work:

- Always use new seals and O-rings when parts are replaced.
- Open the service valves in the heating flow and return.
- Reconnect the boiler to the power mains.
- Switch the main switch on.
- Fill the heating circuit of the boiler to a pressure of between 1.0 and 2.0 bar if required.

- Bleeding the heating installation (see section 6.2, Filling the system).
- Open the gas isolation valve.
- Check the boiler for gas and water leaks.
- If necessary, refill and re-bleed the heating installation.
- Replace the front casing to the boiler.
- Carry out a functional check of the boiler (see section 6.4).
- Always check earth continuity, polarity and resistance to earth with a multimeter after any service work and after replacing any electrical component.

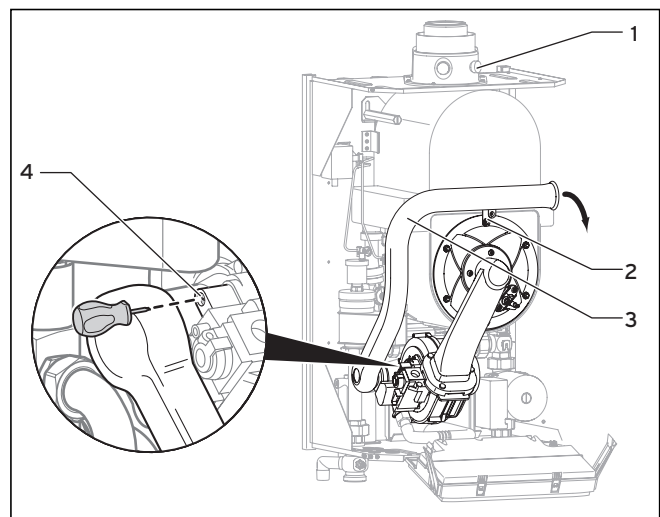
### 8.1.3 Checking the CO<sub>2</sub> concentration



#### **Note**

**Checking/adjustment of the CO<sub>2</sub> concentration is required in the following instances:**

- replacement of gas valve,
- conversion to or from Natural Gas
- or if an incorrect combustion is suspected.



**Fig. 8.1 Measuring the CO<sub>2</sub> concentration, specifying the air ratio (gas setting)**

#### **Legend:**

- 1 Flue gas analysis point
- 2 Screw
- 3 Air intake pipe
- 4 Main throttle



#### **Note**

**The boiler is fitted with a flue gas analysis point (1). A suitable flue gas analyser can be connected to this point to establish the combustion performance of the boiler.**

- Remove the front casing.
- Start the testing program P.1.
- Wait at least 5 minutes until the boiler reaches its operating temperature.
- Measure the CO<sub>2</sub> concentration at the flue gas analysis point (1). Compare the measured value with the corresponding value in Table 8.1.
- If all these points are as required, proceed as described in section 8.1.5.
- If one of the flue gas values is greater than the acceptable values in Table 8.1, then proceed as described in the following section 8.1.4.

#### 8.1.4 Adjusting the CO<sub>2</sub> concentration (or the air ratio)



##### **Danger!**

**Increased risk of poisoning due to incorrect settings!**

**Incorrect setting may increase the risk of poisoning.**

- If one of the flue gas values is greater than the acceptable values in Table 8.1 then check
  - the integrity of the complete flue gas installation
  - the integrity of the combustion circuit seals
  - the gas inlet working pressure
  - the gas flow rate.

If the flue gas value needs to be adjusted,

- unfasten the screw (Fig. 8.1, 2) and
- fold the air intake pipe (Fig. 8.1, 3) forwards through 90°. Do not remove the air intake pipe.
- Specify the required flue gas value if necessary (value with front casing of boiler removed, see Table 8.1) by turning the screw of the main throttle (Fig. 8.1, 4)



##### **Note**

**Use a 4 mm hexagon socket spanner to turn the screw.**

- Turn to the left: higher CO<sub>2</sub> concentration,
- Turn to the right: lower CO<sub>2</sub> concentration.



##### **Note**

**Natural gas: Only perform the adjustment in increments of 1/8 turn and wait approximately 1 minute after each adjustment until the value stabilises.**

**Liquid gas: Only perform the adjustment in very small increments (approximately 1/16 turns), and wait approximately 1 minute after each adjustment until the value stabilises.**

- After performing the adjustments, fold the air intake pipe back up.
- Check the CO<sub>2</sub> concentration once again.
- If necessary, repeat the setting process.

- Push the „i“ button to deactivate the full load mode. The full load mode is also deactivated if no button is pushed for 15 minutes.
- The adjusting screw shall be sealed after the adjustment.
- Re-secure the air intake pipe with the screw (2).
- Put the front casing back on.

Settings	Natural gas (H) Tolerance	Unit
CO <sub>2</sub> after 5 minutes full load mode with boiler front casing closed	9.0 ± 1.0	Vol.-%
CO <sub>2</sub> after 5 minutes full load mode with boiler front casing removed	8.8 ± 1.0	Vol.-%
Set for Wobbe index W <sub>S</sub>	15	kWh/m <sup>3</sup>
CO value with full load	< 250	ppm
CO/CO <sub>2</sub>	< 0,0031	

Table 8.1 Factory gas setting



##### **Danger!**

**Risk to life due to poisoning!**

**CO is an extremely toxic gas. Risk to life due to excessive CO concentrations.**

- If you are not able to adjust the boiler correctly and the flue gas values remain higher than allowed in Table 8.1, call the **Vaillant Service Solutions**.
- **Do not start up the boiler!**

## 8 Inspection and maintenance

### 8.1.5 Inspection and maintenance work steps

No.	Activity	Column 1 Inspection must be carried out each year	Column 2 Maintenance must be carried out at regular intervals - but no longer than 5 years
1	Check the air flue gas installation for leaks and for proper fixation and ensure it is not blocked or damaged and is fitted correctly, complying with the relevant installation instructions.	x	x
2	Carry out a general inspection of the boiler for dirt and dust and clean as necessary.	x	x
3	Visually inspect the complete heat engine for its general condition and for signs of corrosion, sooting or other forms of damage. If damage is evident proceed to column 2.	x	x
4	Measure the gas flow rate during operation with maximum load (section 6.3.2). If the gas flow rate complies to the Table 6.1 continue with column 1, if not proceed to column 2.	x	x
5	Check the gas inlet working pressure (section 6.3.3) operation with maximum load. If the gas inlet working pressure complies to the Table 6.2 continue with column 1, if not proceed to column 2.	x	x
6	Check combustion by measuring CO, CO <sub>2</sub> and CO/CO <sub>2</sub> . If the values are outside the tolerances of Table 8.1 proceed to maintenance column 2. You must not proceed with the maintenance if a new burner door seal kit is not available.	x	
7	Isolate the boiler from the power mains. Check whether the electrical plug connections and the other electrical connections are fitted tightly and correct them if necessary.	x	x
8	Close the gas isolation valve and the service valves.		x
9	Dump the pressure in the boiler on the water side (observe pressure gauge) and check the charge pressure of the expansion vessel. Top up if necessary.		x
10	Remove the compact thermal module.		x
11	Check the integrity of all combustion circuit seals, especially the burner door seal. If there are any damages repair them before proceeding.		x
12	Clean the heat exchanger.		x
13	Check whether the burner is dirty and clean it if necessary.		x
14	Check the condensate siphon in the boiler, clean and fill if necessary.	x	x
15	Check the condensate ducts in the boiler and clean if necessary.	x	x
16	Clean the air separation system.		x
17	Install the compact thermal module. <b>Caution: Use new seals and nuts!</b>		x
18	Open the service valves and fill up the boiler/appliance to approximately 1.0 - 2.0 bar (depending on the static height of the system). Start the bleeding program P.O.		x
19	Open the gas isolation valve, reconnect the boiler with the power mains and switch on the boiler.	x	x
20	Perform a test operation of the boiler and heating installation, including water heating and bleed again if necessary.	x	x
21	Check visually the ignition and burner performance.	x	x
22	Check the boiler for leaks of any kind (gas, flue gas, water, condensate) and rectify as necessary.	x	x
23	If you had problems with the CO, CO <sub>2</sub> , CO/CO <sub>2</sub> -values in Step 6 before the maintenance, check them again now (see Table 8.1). If they are outside of the tolerances of Table 8.1 make an adjustment, see section 8.1.4.		x
24	Complete the gas commission checklist (benchmark book).	x	x

**Table 8.2 Inspection and maintenance steps**

## 8.2 Filling/draining the boiler and heating installation

### 8.2.1 Filling the boiler and the heating installation

A description of how to fill the boiler and heating installation is provided in Chap. 6.2.

### 8.2.2 Draining of the boiler

- Close the service valves of the boiler.
- Open the drain valve on the return line connection.
- To drain the boiler completely, open:
  - the automatic air vent on the air separator,
  - the bleed nipple on the flow line connection.

### 8.2.3 Draining the entire system

- Attach a hose to the draining device on the system.
- Bring the open end of the hose to an appropriate drain point.
- Make sure that the service valves of the boiler are open.
- Open the drain cock.
- Open the bleed valves on the radiators.  
Start from the highest radiator and then work from the top to the bottom.
- Once the water has drained off, close the automatic air vents of the radiator and the drain cock.

## 8.3 Maintenance of the compact thermal module

### 8.3.1 Dismounting the compact thermal module

The compact thermal module consists of the variable-speed fan, the gas/air combination valve, the gas feed (mixture pipe) to the fan premix burner and the premix burner itself. These four individual parts form the compact thermal module component.



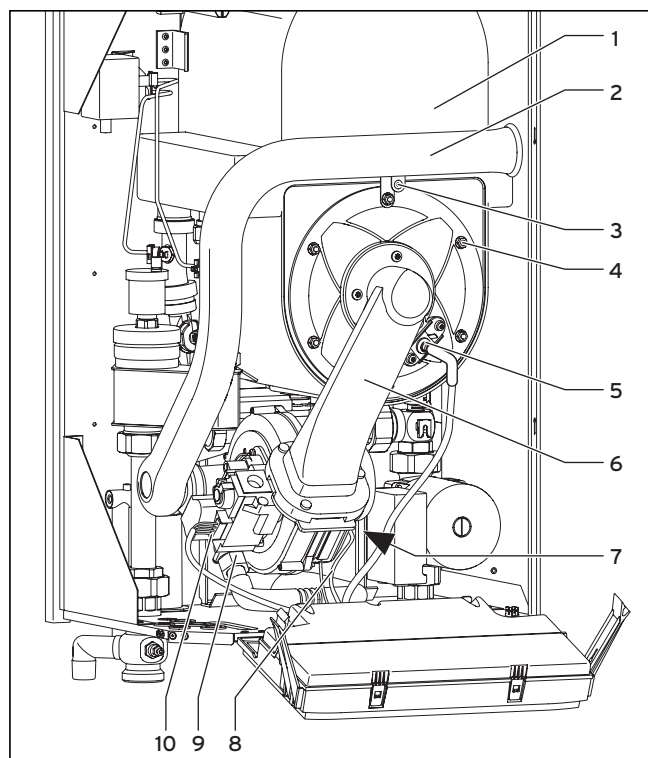
#### **Danger!**

#### **Danger of burning or scalding!**

**There is danger of being burned or scalded at the compact thermal module and at all water-carrying components. Only carry out work on these components once they have cooled down.**

To dismantle the compact thermal module proceed as follows:

- Turn off the boiler by the main switch.
- Isolate the boiler from the electrical mains.
- Cut off the gas supply to the boiler.
- Remove the front casing of the boiler.
- Swing off the electronic box.



**Fig. 8.2 Dismounting compact thermal module**

- Unfasten the fixing screw on the air intake pipe (3).
- Swing the air intake pipe (2) forwards.
- Remove the air intake pipe from the intake port.
- Disconnect the two plugs for the ignition and grounding connections from the ignition electrode (5).
- Disconnect the gas supply (9) on the bottom of the gas valve.
- Disconnect the cable (7) from the coupling plug in the feed to the fan motor, the PWM signal cable on the bottom of the fan (8) and the cable to the gas valve (10).
- Undo the six nuts (4).



#### **Caution!**

#### **Damage to gas supply!**

**Under no circumstance may the compact thermal module be suspended from the flexible corrugated gas pipe.**

- Pull off the entire compact thermal module (6) from the heat exchanger (1).
- After dismantling the burner and heat exchanger, check for damage and soiling - clean the components if necessary as described below.

## 8 Inspection and maintenance



### **Danger!**

**Danger of combustion and damage due to escaping hot flue gases!**

**The silicone seal and the silicate cord on the compact thermal module (No. 180904) must be replaced at every maintenance operation. The insulating layer on the burner door (No. 180913) must not exhibit any signs of damage; otherwise it must also be replaced (see Chap. 8.3.4).**

### 8.3.2 Cleaning the heat exchanger



### **Caution!**

**Danger of short-circuiting and irreparable damage to the PCB and fan!**

**Protect the downfolded electronic box and also the fan against splash water.**

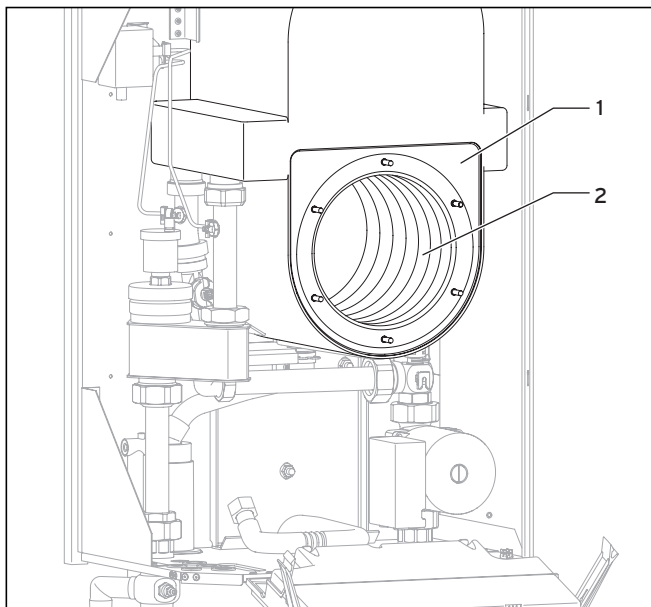


Fig. 8.3 Cleaning the heat exchanger

- Dismount the compact thermal module as described under 8.3.1.
- Clean the heating coil (2) of the heat exchanger (3) using commercially-available essence of vinegar. Flush with water. The water flows out of the heat exchanger through the condensate siphon. You can also clean the condensate trap via the opening (4).
- Allow the cleaning agent to take effect for approximately 20 minutes then rinse off the loose dirt. To clean the coils you can use a brush with synthetic bristles, but no aids with metallic or similar materials. Avoid getting large amounts of water directly on the insulating mat at the back wall of the heat exchanger. Otherwise the insulating mat can be damaged.

### 8.3.3 Checking the burner

The burner is maintenance-free and needs no cleaning.

- Check the surface of the burner for damage, replace the burner if necessary.
- After checking/repairing the burner install the compact thermal module as described in Chap. 8.3.4.

### 8.3.4 Installing the compact thermal module

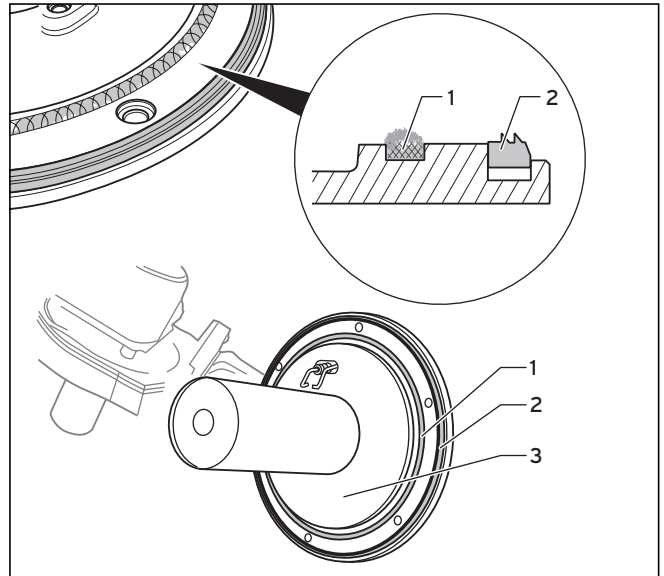


Fig. 8.4 Replacing the seals and the insulating layer on the burner door

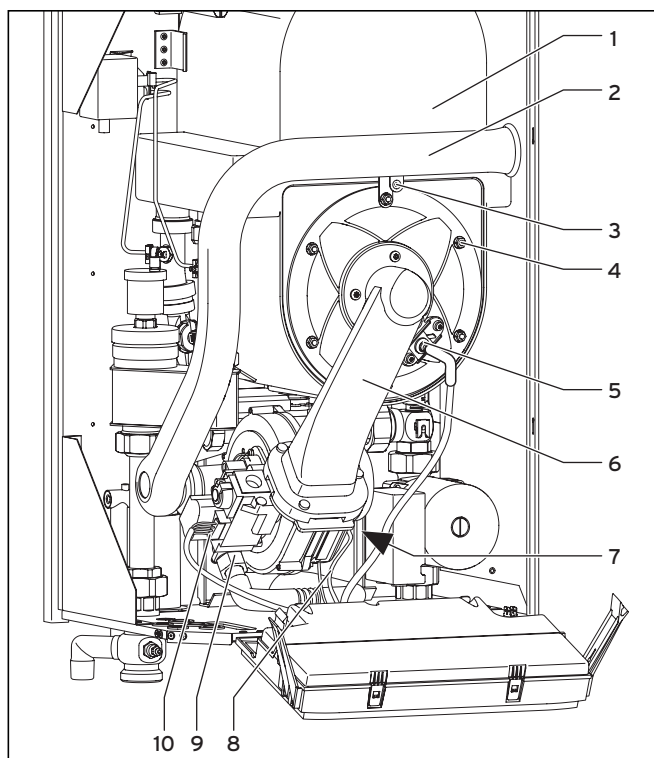


### **Danger!**

**Danger of combustion and damage due to escaping hot flue gases!**

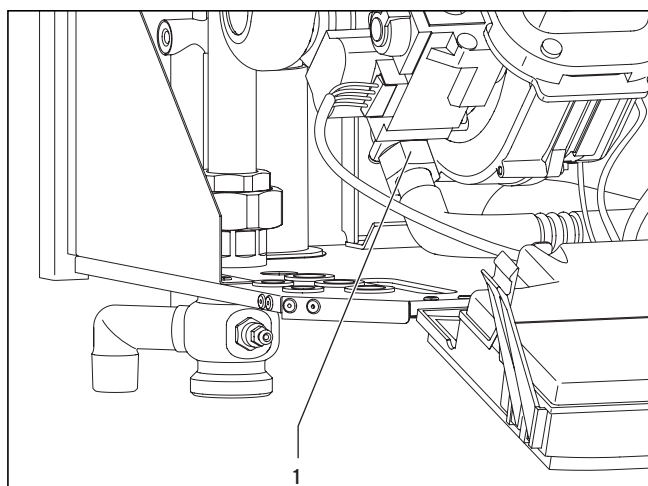
**The silicone seal and the silicate cord on the compact thermal module (No. 180904) must be replaced at every maintenance operation. The insulating layer on the burner door (No. 180913) must not exhibit any signs of damage; otherwise it must also be replaced.**





**Fig. 8.5 Installing the compact thermal module**

- Insert the compact thermal module (6) into the heat exchanger (1).
- Tighten the six nuts (4) including the retainer for the air intake pipe crosswise until the burner door is uniformly seated on the contact surfaces.
- Make sure the blue sealing ring in the air intake pipe is positioned correctly in the seal face.
- Insert the air intake pipe (2) onto the intake stubs and fasten the pipe with the retaining screw (3).
- Plug on the ignition wire and the ground connection.
- Plug in the cable (7) to the coupling plug in the feed to the fan motor, the PWM signal cable on the bottom of the fan (8) and the cable to the gas valve (10).
- Connect the gas supply (9) with a **new seal** to the gas valve. Use the spanner flat at the flexible gas line to hold up the gas valves.



**Fig. 8.6 Checking for gas tightness**



## **Caution!**

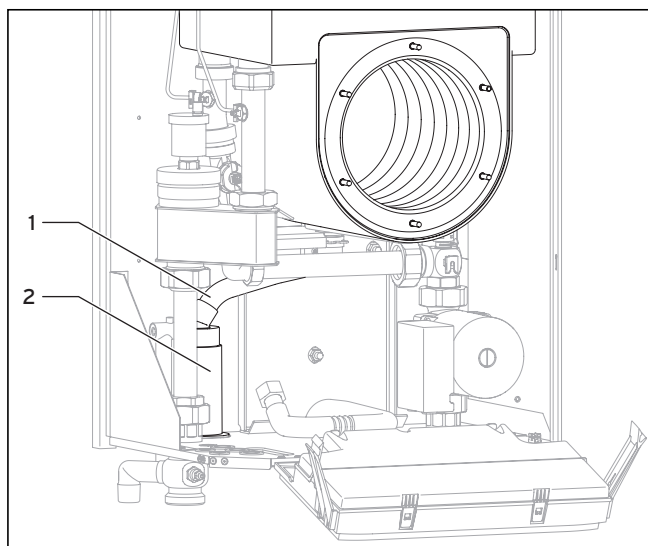
Open the gas feed and check the gas tightness of the boiler with leak detector spray. Check the screwed connection (1) particularly carefully.

## **8.4 Cleaning the condensate ducts and the condensate siphon**



## **Danger!**

If the boiler is operated with empty condensate siphon, there is risk of poisoning from escaping flue gases. Therefore, fill up the siphon again after each cleaning session.



**Fig. 8.7 Cleaning the condensate ducts**

For the purpose of cleaning the condensate ducts, the condensate hose (1) of the heat exchanger and the complete condensate siphon (2) can be dismantled.

## 8 Inspection and maintenance

After that, both can be cleaned in the dismantled state. Take note also of the accompanying installation manual for the siphon cartridge.

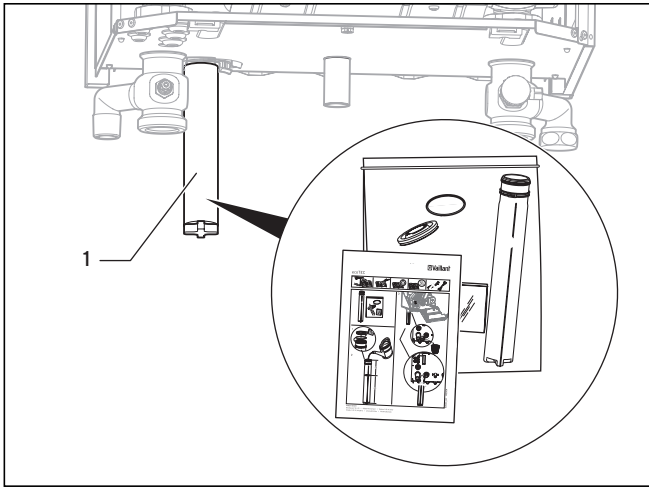


Fig. 8.8 Cleaning the condensate siphon

- Dismount the siphon cartridge (1) below the boiler.
- Clean the siphon cartridge.
- Remove the clamp below the heat exchanger.
- Pull off the connecting bracket.
- Dismount the siphon and the corrugated pipe (pay attention to the position of the latching tabs).
- Clean the components.



### Caution!

#### Risk of damage!

**Take care that no water splashes onto other components!**

After cleaning, refit all the components in the condensate duct (see the siphon installation manuals). Be absolutely sure to fill the siphon cartridge with water. Insert new seals at all points and check the condensate duct for leaks.

## 8.5 Cleaning the air separation system



### Danger!

#### Danger of burning or scalding!

**All water-carrying components present a danger of injury and scalding. Only carry out work on these components if they have cooled down.**

- Drain the boiler (see Chap. 8.2.2).

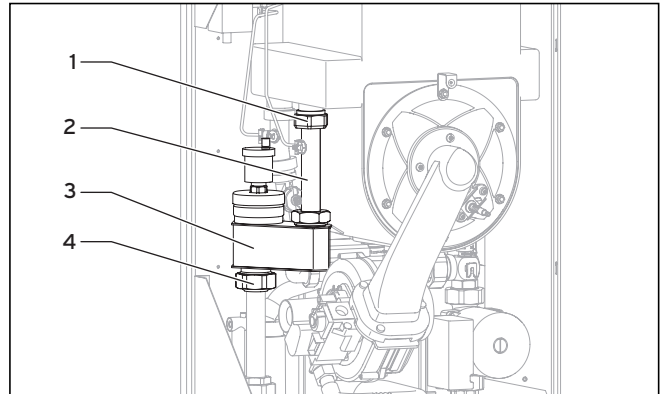


Fig. 8.9 Removing the air separator

- Unfasten the 1 1/2 " nut (4) on the lower outlet.
- Unfasten the 1/4 " cap nut (1) on the upper inlet (unfasten the cable harness).
- Push the casing (3) to the front.
- Pull out the complete assembly to the front. Dismount the pipe (2) only if necessary.

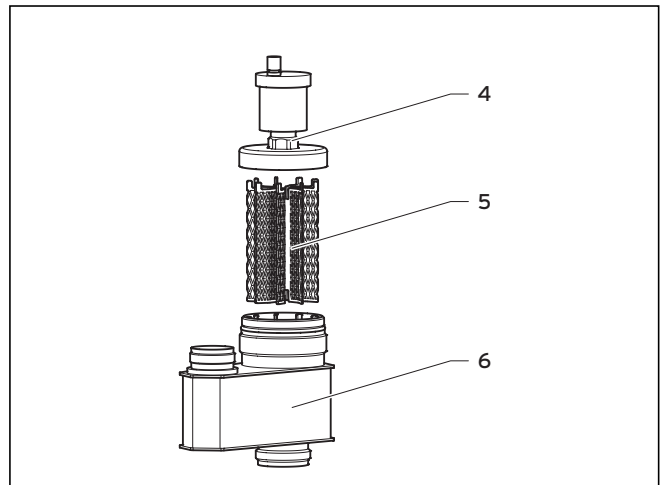


Fig. 8.10 Cleaning the filter

- Unscrew the brass cover (4) of the steel casing (6).
- Pull out the filter (5) upwards.
- Rinse out the air separator with hot water.
- Clean the filter with hot water or replace it with a new one.
- Insert the filter into the air separator.



## Caution!

**All O-rings must be replaced with new ones as otherwise leaks may occur!**

- Screw the brass cover onto the air separator.
- Reassemble the air separator in the reverse order.
- Fill and bleed the boiler (see Chap. 6.2)

### 8.6 Checking the charge pressure of the external expansion vessel

- Measure the charge pressure of the expansion vessel at the testing nozzle of the vessel when the appliance is depressurised.
- Fill the gas cushion as required to the prescribed nominal pressure according to the identification plate.
- If water is discharged at the testing nozzle of the expansion vessel the vessel must be replaced.

### 8.7 Checking gas connection pressure (inlet working pressure)

To check the connection pressure proceed as described in Chap. 6.3.3.

### 8.8 Checking the CO<sub>2</sub> concentration

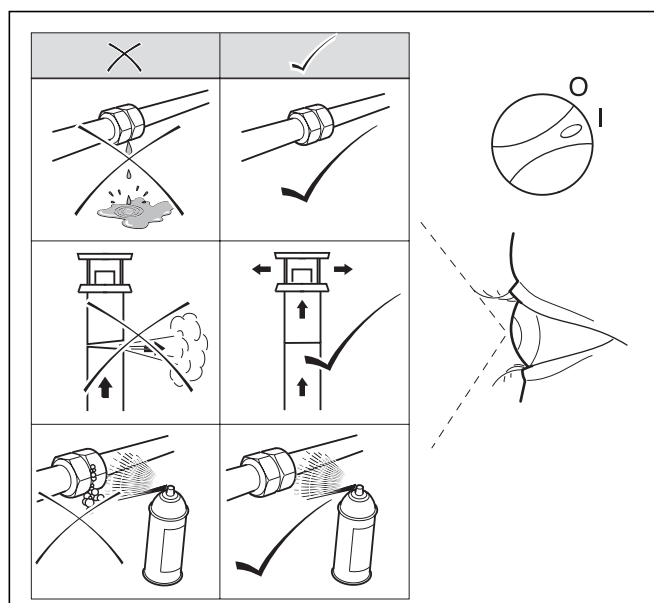
To check the CO<sub>2</sub> concentration follow the procedure described in Chap. 8.1.3.

### 8.9 Test operation

Always perform the following checks after completing any maintenance task:

- Start up the appliance in accordance with the instructions in the relevant operating manual.

- Check the appliance for gas and water leaks.
- Check the flue system for leaks and for proper fixation.
- Check over-ignition and that the flame on the burner is burning evenly.
- Check the function of the heating (see Chap. 6.4.1) and hot water generation (see Chap. 6.4.2)
- Document the inspection/maintenance tasks carried out in the form provided in the inspection or maintenance contract.



**Fig. 8.11 Tightness check**

## 9 Troubleshooting



### Note!

Whenever possible, please quote the fault code displayed (F.xx) and the status of the boiler (S.xx) when contacting the Vaillant customer service or your Vaillant service partner.

### 9.1 Diagnostics

#### 9.1.1 Status codes

The status codes that you can see on the display provides information about the current operating condition of the boiler.

The display of the status codes can be viewed as follows:

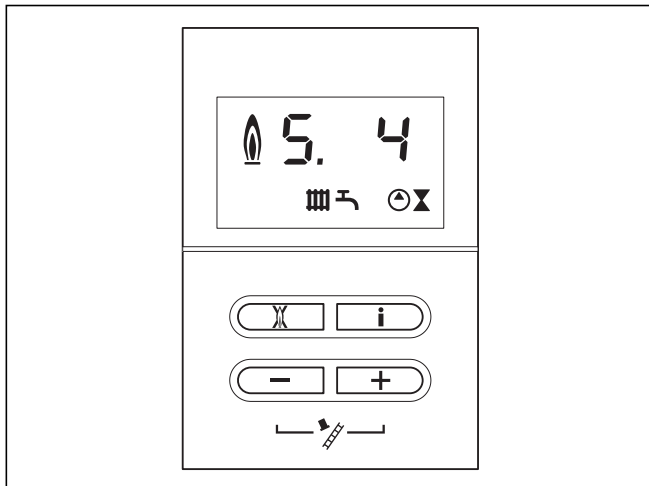


Fig. 9.1 Display of status codes

- Push the "i" button.  
The status code appears in the display, e.g. S.4 for "Burner operation, heating".

The display of the status codes can be ended as follows:

- Push the "i" button  
or
- Do not push any buttons for about 4 minutes.  
Depending on the settings, the current flow temperature or current water pressure of the heating installation reappears in the display.

Display	Meaning
<b>Heating mode</b>	
S.0	Heating mode no heat demand
S.1	Heating mode fan start-up
S.2	Heating mode pump pre-run
S.3	Heating mode ignition
S.4	Heating mode burner on
S.5	Heating mode pump/fan overrun
S.6	Heating mode fan overrun
S.7	Heating mode pump overrun
S.8	Heating remaining off-time xx min
<b>Domestic hot water mode (DHW)</b>	
S.20	Hot water requirement
S.21	Fan start-up
S.22	Pump pre-run
S.23	Ignition
S.24	Burner on
S.25	Pump/fan overrun
S.26	Fan overrun
S.27	Mode pump overrun
S.28	Burner off-period
<b>Other:</b>	
S.30	Heating mode blocked by room thermostat (terminal 3-4 open)
S.31	Summer mode active or no heat demand from eBUS controller
S.32	Heat exchanger antifreeze active, as fan speed variation is too high. Appliance is within the waiting time of the operation block function
S.34	Antifrost mode active
S.36	Reference setting of continuous controller 7-8-9 or e-BUS controller is < 20°C and blocks the heating mode
S.39	Contact thermostat activated
S.41	Water pressure > 2.8 bar
S.42	Exhaust gas diverter return signal blocks burner operation (only in connection with accessories) or condensate pump faulty, heat demand is blocked
S.53	Unit is observing the waiting time for the modulation block/operation block function due to a water shortage (flow-return difference too large)
S.54	Unit is observing the waiting period of the operation block function due to a water shortage (temperature gradient)
S.59	Waiting time: minimum quantity of circulation water not achieved
S.85	Check quantity of circulation water
S.96	Return sensor test running, heating demands are blocked
S.97	Water pressure sensor test running, heating demands are blocked
S.98	Self-test flow/return NTC

Table 9.1 Status codes

## 9.1.2 Diagnosis codes

In the diagnosis mode, you can change certain parameters or display more information. The diagnosis information is divided into two diagnosis levels. The 2<sup>nd</sup> diagnosis level can be reached only after entering a password.



### Caution!

**The access to the 2<sup>nd</sup> diagnosis level may only be used by a qualified heating engineer.**

### 1<sup>st</sup> diagnosis level

- Push the "i" and "+" buttons simultaneously. The display shows "d.O".
- Scroll to the desired diagnosis number on the 1<sup>st</sup> diagnosis level with the "+" or "-" buttons (see Table 9.2).
- Push the "i" button. The display shows the relevant diagnosis information.
- If necessary, use the "+" or "-" keys to change the value (display flashes).
- Save the new value by holding the "i" button pressed for about 5 seconds until the display stops flashing.

You can finish the diagnosis mode as follows:

- Push the "i" and "+" buttons simultaneously or
- Do not push any buttons for about 4 minutes.

The current heating flow temperature or the current water pressure of the heating installation reappears in the display.

## 9 Troubleshooting

Display	Meaning	Display value/adjustable value
d.0	Heating partial load	Adjustable heating partial load in kW (factory setting: approx. 70% of maximum output)
d.1	Pump overrun for heating mode	2 - 60 minutes (factory setting: 5)
d.2	Maximum blocking time heating at 20°C flow temperature	2 - 60 minutes (factory setting: 20)
d.4	Measured value of cylinder sensor	in °C
d.5	Target value of flow temperature (or target value of return)	in °C, maximum of the value set in d.71, limited by an eBUS controller if connected)
d.7	Set hot water temperature	40 to 65 °C (maximum temperature can be adjusted at d.20)
d.8	Room thermostat at terminals 3-4	0 = Room thermostat open (no heat request) 1 = Room thermostat closed (heat request)
d.9	Set target flow temperature at terminal 7-8-9	in °C, minimum off, target value of ext. eBus and target value of terminal 7
d.10	Status of internal pump	1 = on, 0 = off
d.11	Status external heating pump	1 to 100 = on, 0 = off
d.12	Status of cylinder primary pump	1 to 100 = on, 0 = off
d.13	Status of hot water circulation pump	1 to 100 = on, 0 = off
d.15	Pump speed actual value	Actual value internal pump in %
d.22	Hot water requirement via C1/C2, internal hot water control system	1 = on, 0 = off
d.23	Summer/winter operation (heating on/off)	1 = heating on (winter mode), 0 = heating off (summer mode)
d.24	not relevant	not relevant
d.25	Hot water generation enabled by eBUS controller	1 = yes, 0 = no
d.29	Actual value, sensor circulation water quantity	Actual value in m³/h
d.30	Control signal for the gas valve	1 = on, 0 = off
d.33	Fan speed target value	in rpm/10
d.34	Fan speed actual value	in rpm/10
d.35	not relevant	Not relevant
d.40	forward flow temperature	actual value in °C
d.41	Return flow temperature	actual value in °C
d.44	digitalised ionisation voltage	Display range 0 to 102, >80 no flame, <40 good flame display
d.47	External temperature (with weather-controlled Vaillant controller)	Actual value in °C
d.76	Boiler variant (display): Device specific number (DSN)	47
d.90	Digital regulator status	1 = detected, 0 = not detected (eBUS Address <=10)
d.91	DCF status with external sensor connected	0 = no reception, 1 = reception, 2 = synchronised, 3 = valid
d.97	Activation of the 2 <sup>nd</sup> diagnosis level	Code: 17 for level 2

**Table 9.2 Diagnosis codes in the 1<sup>st</sup> diagnosis level**

### 2<sup>nd</sup> diagnosis level

- Scroll as described above in the 1<sup>st</sup> diagnosis level to diagnosis number d.97.
- Change the displayed value to **17** (password) and save this value.

You are now in the 2<sup>nd</sup> diagnosis level in which all information from the 1<sup>st</sup> (see Table 9.2) and the 2<sup>nd</sup> (see Table 9.3) is displayed.

Scroll and change values and exit diagnosis mode as described in the 1<sup>st</sup> diagnosis level.



### Note!

**If you push the buttons "i" and "+" within 4 minutes of leaving the 2<sup>nd</sup> diagnosis level, you can directly access the 2<sup>nd</sup> diagnosis level without re-entering the password.**

Display	Meaning	Display value/adjustable value
d.14	Pump speed target value	Target value of internal pump in % Possible settings: 0 = auto (factory setting) 1 = 53 2 = 60 3 = 70 4 = 85 5 = 100 (factory setting)
d.17	Heating flow/return regulation changeover	0 = flow, 1 = return (factory setting: 0)
d.18	Specifying the pump operating mode	0 = overrun 1 = run on 2 = winter 3 = intermittent (factory setting)
d.20	Maximum setting for cylinder target value	40 to 70°C (factory setting: 65°C)
d.26	Additional relay control ecoTEC	1 = circulator 2 = ext. pump (factory setting) 3 = cylinder charge pump 4 = extractor hood 5 = ext. solenoid valve 6 = ext. fault message 7 = not active 8 = remote control eBUS (not yet supported) 9 = legionella pump (not active)
d.27	Switch of relay 1 on the multifunction module "2 in 7"	1 = circulator (factory setting) 2 = ext. pump 3 = cylinder charge pump 4 = extractor hood 5 = ext. solenoid valve 6 = ext. fault message 7 = not active 8 = remote control eBUS (not yet supported) 9 = legionella pump (not active)
d.28	Switch of relay 2 on the multifunction module "2 in 7"	1 = circulator 2 = ext. pump (factory setting) 3 = cylinder charge pump 4 = extractor hood 5 = ext. solenoid valve 6 = ext. fault message 7 = not active 8 = remote control eBUS (not yet supported) 9 = legionella pump (not active)
d.50	Offset for minimum speed	in rpm/10, adjustment range: 0 to 300 (factory setting 30)
d.51	Offset for maximum speed	in rpm/10, adjustment range: -99 to 0 (factory setting -45)
d.60	Number of temperature limiter shutdowns	Number
d.61	Number of faults in automatic combustion system	Number of successful ignitions in the last attempt
d.64	Average ignition time	in seconds
d.65	Maximum ignition time	in seconds
d.67	Remaining burner locking time	in minutes
d.68	Unsuccessful ignitions at 1 <sup>st</sup> attempt	Number
d.69	Unsuccessful ignitions at 2 <sup>nd</sup> attempt	Number
d.70	not relevant	Not relevant
d.71	Target value maximum heating flow temperature	Adjustment range in °C 40 to 85 (factory setting: 75)
d.72	Pump overrun time after cylinder charging	Setting range in seconds: 0, 10, 20 to 600 (factory setting: 80 s)
d.75	Maximum charging time for hot water cylinder without independent control system	Adjustment range in min: 20 - 90 (factory setting: 45 min)
d.77	Limitation of cylinder charging output in kW	Adjustment range in kW: depending on boiler (factory setting: maximum output)
d.78	Limitation of charging temperature in °C	55 to 85°C (factory setting: 80 °C)
d.80	Operating hours heating	in h <sup>1)</sup>

**Table 9.3 Diagnosis codes for diagnosis level 2 (continued on next page)**

## 9 Troubleshooting

Display	Meaning	Display value/adjustable value
d.81	Operating hours hot water generation	in h <sup>1)</sup>
d.82	Burner start-ups in heating mode	Number/100 <sup>1)</sup> (3 equals 300)
d.83	Burner start-ups in hot water mode	Number/100 <sup>1)</sup> (3 equals 300)
d.84	Maintenance indicator: Number of hours until the next maintenance	Setting range: 0 to 3000h and "--" for deactivated Factory setting: "--" (300 corresponds to 3000h)
d.93	DSN appliance variant setting	Setting range: 0 to 99
d.96	Factory setting	1 = yes (Resetting adjustable parameters to factory setting) 2 = no
1) In the diagnosis codes 80 to 83 5 digit figure values are stored. When selecting e.g. d.80 only the first two digits of the figure value are displayed (e.g.10). By pressing the "i" key, the display switches over to the last three figures (e.g. 947). The operating hours counter of the heating in this case would be 10947 h. Pressing the "i" again causes the display to switch back to the diagnosis point that was called up.		

**Table 9.3 Diagnosis codes at diagnosis level 2 (continued)**

### 9.1.3 Fault codes

The fault codes displace all other displays when errors occur. Errors are displayed as "F ...", e.g. "F.10" (see Table 9.4).

If several errors occur simultaneously, each fault code is displayed for approximately two seconds on an alternating basis.

Once you have repaired the error push the fault clearance key to restart the boiler.

If the error cannot be repaired and reoccurs despite having carried out several fault clearance attempts, please contact your factory customer service.

### 9.1.4 Fault memory

The last ten errors which occurred are saved in the appliance fault memory.

- Push the "i" and "--" buttons simultaneously.
- Scroll back in the error memory with the "+" button.

You can exit the fault memory display as follows:

- Push the "i" button  
or
  - Do not push any buttons for about 4 minutes.
- Depending on the settings, the current flow temperature or current filling pressure of the heating installation reappears in the display.



Code	Meaning	Cause
F. 0	Interruption, flow temperature sensor	NTC plug not plugged in or has come loose, multiple plug on electronics not plugged in correctly, interruption in cable harness, NTC defective
F. 1	Interruption, return temperature sensor	NTC plug not plugged in or has come loose, multiple plug on electronics not plugged in correctly, interruption in cable harness, NTC defective
F.10	Short circuit flow sensor	Short to ground/short circuit in cable harness, NTC defective
F.11	Short circuit, return sensor	Short to ground/short circuit in cable harness, NTC defective
F.13	Short circuit cylinder sensor	Short to ground/short circuit in cable harness, moisture in plug, NTC defective
F.20	Safety switch-off, temperature limiter	Incorrect earth connection between cable harness and boiler, flow or return NTC defective (loose connection), black discharge via ignition cable, ignition plug or ignition electrode
F.22	Safety switch-off, water shortage	No or insufficient water in boiler, cable for pump, water pressure sensor or volume flow sensor loose/not plugged in/defective, pump blocked or defective, pump output too low, non-return valves blocked/incorrectly installed, minimum quantity of circulation water not reached, flow sensor defective
F.23	Safety switch-off: temperature difference too great	Pump blocked, insufficient pump output, air in appliance, system pressure too low, flow and return NTC interchanged
F.24	Safety switch-off: temperature increase too fast	Pump blocked, poor pump performance, air in boiler, installation pressure too low, non-return valves blocked/incorrectly installed, flow and return NTC mixed up
F.25	Safety switch-off: Flue gas temperature too high	Break in plug connection for optional flue gas safety thermostat, break in cable harness
F.27	Safety switch-off: flame simulation	Moisture on electronics, electronics (flame monitor) defective, gas solenoid valve leaking
F.28	Failure during start-up: ignition unsuccessful	gas meter defective, gas pressure monitor has been triggered, air in gas, gas flow pressure too low, Thermal isolator device (TAE) has been triggered, condensate duct blocked, incorrect gas throttle, error at gas valve, multiple plug on electronics incorrectly plugged in, break in cable harness, ignition system (ignition transformer, ignition cable, ignition plug, ignition electrode) defective, ionisation current interrupted (cable, electrode), incorrect earthing of boiler, electronics defective
F.29	Failure during operation: re-ignition unsuccessful	Gas feed interrupted from time to time, flue gas recirculation, condensate duct blocked, faulty earthing of boiler
F.32	Error, fan	Plug at fan not correctly plugged in, multiple plug on electronics not correctly plugged in, break in cable harness, fan blocked, Hall sensor defective, electronics defective
F.49	Error, eBUS	Short-circuit on eBUS input, eBUS overload or two power supplies with different polarities on the eBUS
F.61	Error, fuel valve control	short circuit/short to ground in cable harness for gas valve, gas valve defective (coils shorted to ground), electronics defective
F.62	Error, fuel valve switch-off delay	delayed shutdown of gas valve, delayed extinguishing of flame signal, gas valve leaking, electronics defective
F.63	EEPROM error	Electronics defective
F.64	Error, electronics/sensor	Flow or return NTC short circuited, electronics defective - recirculation
F.65	Error, temperature of electronics	Electronics too hot due to external effect, electronics defective
F.67	Error, electronics/flame	Implausible flame signal, electronics defective
F.70	Invalid boiler ID	Spare part case: Display and electronics changed at the same time boiler variant not re-set
F.71	Error, flow temperature sensor	Flow temperature sensor signalling constant value -> flow temperature sensor defective

**Table 9.4 Fault codes (continued on next page)**

## 9 Troubleshooting

Code	Meaning	Cause
F.72	Flow and/or return temperature sensor fault	Temperature difference between flow temperature sensor and return temperature sensor too great -> flow and/or return temperature sensor defective
F.73	Error in water pressure sensor	Interruption/short-circuit of water pressure sensor, interruption/short-circuit to GND in supply line to water pressure sensor
F.74	Water pressure sensor signal outside correct range (too high)	Line to water pressure sensor has short-circuited at 5V/24V or internal error in water pressure sensor
F.75	Error, pump water shortage	Water pressure sensor and/or pump defective, air in heating system, too little water in boiler; check adjustable bypass, connect external expansion vessel to return
F.77	Error, flue gas flap/condensate pump	condensate pump defective, cable connection; no checkback signal from flue gas flap (bridge) of "2 in 7" multifunction module, flue gas flap has triggered
con	No communication with the printed circuit board	Communication error between display and PCB in the electronic box

**Table 9.4 Fault codes (continued)**

### 9.2 Test programs

Special functions can be triggered in the boilers by activating various test programs.

The test programs P.0 to P.6 are started as follows:

- Push the "+" button and hold it down.
- Push the "Fault clearance key" once or switch the main switch off and on again.

After approximately 5 seconds, P.0 appears in the display. You can now release the "+" button.

- Push the "+" key to start counting the test programme number upwards.
- Push the "i" to operate the boiler now and to start the test programme.
- Push "i" and "+" simultaneously to exit the test programs. You can also exit the test programs by not pushing any button for 15 minutes.

Display	Meaning
P. 0 <sup>1)</sup>	Bleeding test program The heating circuit and the hot water circuit are bled via the automatic automatic air vent (the cap of the automatic automatic air vent must be released). 1 x "i" button: Start bleeding heating circuit (display view: HP) 2 x "i" button: Start bleeding charging circuit (display view: SP) 3 x "i" button: Exit bleeding program  The heating pump is cyclically actuated <b>Note:</b> The bleeding program takes about 6.5 minutes to complete.
P.1	Test program, maximum load: The boiler is operated at full load following successful ignition and calibration.
P.2	Test program, minimum load: The boiler is operated at minimum load following successful ignition and calibration.
P.5	Test program, safety thermostat: The burner is switched on at maximum output and the temperature control is switched off so that the boiler produces heat, bypassing a regular shutdown, until the switch-off temperature of the safety thermostat is reached (97 °C).
P.6	Test program, Diverter valve centre position: (not active)

**Table 9.5 Test programs**

- <sup>1)</sup> Bleeding the boiler circuit:  
Actuation of heating pump for 15 cycles: 15 s on, 10 s off.  
Display view: HP or SP.

### 9.3 Resetting parameters to factory settings

In addition to the option of manually resetting the factory settings for the individual parameters specified in Tables 9.2 and 9.3, you can also reset all parameters simultaneously.

- Change the value at diagnosis point "d.96" in diagnosis level 2 to 1 (see Chap. 9.1.2).

The parameters of all adjustable diagnosis points now correspond to the factory settings.

## 10 Replacing components

The tasks listed below in this section may be carried out only by a heating engineer.

- Only use genuine spare parts for repairs.
- Make sure the parts are correctly fitted and that their original position and alignment are retained.

### 10.1 Safety instructions



#### **Danger!**

**Each time components are replaced, comply with the safety instructions below for your own safety and to avoid damage to the boiler.**

- Take the boiler out of operation.



#### **Danger!**

**Risk of fatal electric shock through contact with live connections!**  
**Disconnect the boiler from the power mains by de-energising the boiler using an isolating device with a contact opening of at least 3 mm (e.g. fuses or power switches).**

- Close the gas isolation valve and the service valves in the heating supply and return.
- Close the service valve in the cold water supply pipe.
- Empty the boiler if you want to replace water-bearing components of the boiler.
- Make sure that water does not drip on live components (e.g. the electronic box).
- Use only new seals and O-rings!
- After completing the work, perform a tightness check and function check (see Chap. 6.4).

### 10.2 Replacing the burner



#### **Danger!**

**Before replacing the component, observe the safety information in Chap. 10.1.**

- Dismount the compact thermal module as described in Chap. 8.3.1.

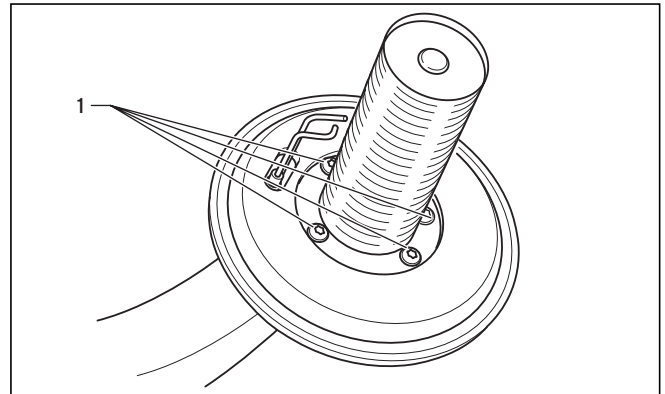


Fig. 10.1 Replacing the burner

- Release the four screws (1) on the burner, and remove the burner.
- Mount the new burner with a new seal. Make sure the seal notch for the inspection glass fits into the notch of the burner flange.
- Re-install the compact thermal module as described in Chap. 8.3.4.
- After completing the work, perform a gas-tightness check and function check (see Chap. 8.9)

### 10.3 Replacing the fan or gas valve



#### **Danger!**

**Before replacing the component, observe the safety information in Chap. 10.1.**

- Remove the compact thermal module as described in Chap. 8.3.1.
- Replace the defective components.



#### **Danger!**

**Danger of personal injury and damage to property from gas escapes!**  
**The gas valve and fan must be returned to their previous installation position. Use new seals without exception!**

- Re-install the complete "gas valve/fan" boiler in the reverse sequence.
- After completing the work, perform a gas-tightness check and function check (see Chap. 8.9)

## 10 Replacing components

### 11 Vaillant Service

### 12 Recycling and disposal

#### 10.4 Replacing the heat exchanger



##### **Danger!**

**Before replacing the component, observe the safety information in Chap. 10.1.**

- Observe the installation manual that accompanies the spare part.

If you have any questions, please contact Vaillant Service Solutions (see Chap. 11)

#### 10.5 Replacing electronics and display



##### **Danger!**

**Before replacing the component, observe the safety information in Chap. 10.1.**



##### **Danger!**

**Risk of fatal electric shock through contact with live connections!**  
**Disconnect the boiler from the power mains by pulling out the mains plug or deenergising the boiler using an isolating device with a contact opening of at least 3 mm (e.g. fuses or power switches). Only after this procedure you may continue the installation.**

- Comply with the assembly and installation manuals provided with the spare parts.

#### **Replacing the display or electronics**

If you are replacing only one of the two components, the parameter adjustment functions automatically. By switching on the boiler, the new component takes over the previously set parameters from the unreplaced components.

#### **Simultaneously replacing display and electronics**

If both components are replaced at the same time (in event of spare part installation) the boiler enters error mode when it is started up and displays the fault code "F.70".



##### **Caution!**

##### **Risk of damage!**

**If you replace both components at the same time, it is essential to check whether the correct replacement display for this equipment variant is available. You cannot use any other replacement displays!**

- Enter the number of the boiler variant under diagnosis point "d.93" at the second diagnosis level in accordance with Table 10.1 (see Chap. 9.1.2).

Boiler	Number of boiler variant (DSN)
ecoTEC VU GB 656/4-5 H	47

Table 10.1 Boiler variant numbers

The electronics is now set to the boiler type and the parameters of all adjustable diagnosis points correspond to the factory settings. You can now make the specific settings for the system.

## 11 Vaillant Service

To ensure efficient and reliable operation of your boiler it is recommended that regular servicing is carried out by your service provider.

Vaillant Applied System Sales  
Vaillant Ltd., Unit D1 Lowfields Business Park, Elland.  
West Yorkshire. HX5 9DG

#### Training

Telephone 01634 292370  
Fax 01634 292354  
email training@vaillant.co.uk

#### Commercial Service

Telephone 0870 850 3072  
Mon - Fri 8.30 - 17.30

Fax 01773 525 946  
email aftersales@vaillant.co.uk

## 12 Recycling and disposal

Both the gas fired boiler and its packaging consist mainly of recyclable raw materials.

### 12.1 Boiler

The boiler and the accessories do not belong to domestic waste. Make sure the old boiler and any existing accessories are disposed of properly.

### 12.2 Packaging

The transport packaging is disposed by the skilled trade company that installed the boiler.



##### **Note!**

**Please observe the applicable national legal regulations.**

# 13 Technical data

ecoTEC	VU 656/4	unit
Heat Output Range (heating 50/30 °C)	14,6 - 67,6	kW
Heat Output Range (heating 80/60 °C)	13,8 - 63,7	kW
Maximum Heat Input (Net)	65	kW
Net Efficiency at 100% load	98	%
Net Efficiency at 30% load	108	%
SEDBUK rating	A	
SAP seasonal Efficiency	90,5	%
Inlet gas working pressure required (natural gas)	20	mbar
NOx class	5	-
NOx level	55	mg / kW hr
CO <sub>2</sub> Percentage (after 5 minutes full load +/- 1)	8,8	%
Recommended CO level	150	ppm
Gas Rate (natural gas)	6,9	m <sup>3</sup> / h
rated water volume (when $\Delta T = 20$ K)	2750	l / h
max. flow temperature approx.	85	°C
Maximum operating pressure	3	bar
condensate volume (pH value: 3.0-4.0)	6,5	l/h
water content	6,5	l
flue gas mass flow min./max	6,5 / 30,3	g/s
flue gas temperature min./max.	40 / 70	°C
pressure drop across the heat exchanger (at full load and $\Delta T$ 20 K)	375	mbar
Connections heating flow/return	1" internal 1,5" external	mm / "
Gas inlet	25	mm
Pressure safety valve	3/4 "	mm / "
Condensate drain	19	mm
Flue connection	80/125	mm
Lift weight	75	kg
height	800	mm
width	480	mm
depth	472	mm
electrical connection	230 / 50	V / Hz
electrical power consumption min./max. (with integrated pump)	170 / 260	W
type of protection	IP X 4 D	-
CE-number (PIN)	CE-0085BR0308	

**Table 13.1 Technical data ecoTEC**



BENCHMARK No. | | | | | | |

## GAS BOILER COMMISSIONING CHECKLIST

BOILER SERIAL No. \_\_\_\_\_ NOTIFICATION No. \_\_\_\_\_

**CONTROLS** To comply with the Building Regulations, each section must have a tick in one or other of the boxes

TIME & TEMPERATURE CONTROL TO HEATING	ROOM T/STAT & PROGRAMMER/TIMER <input type="checkbox"/>	PROGRAMMABLE ROOMSTAT <input type="checkbox"/>
TIME & TEMPERATURE CONTROL TO HOT WATER	CYLINDER T/STAT & PROGRAMMER/TIMER <input type="checkbox"/>	COMBI BOILER <input type="checkbox"/>
HEATING ZONE VALVES	FITTED <input type="checkbox"/>	NOT REQUIRED <input type="checkbox"/>
HOT WATER ZONE VALVES	FITTED <input type="checkbox"/>	NOT REQUIRED <input type="checkbox"/>
THERMOSTATIC RADIATOR VALVES	FITTED <input type="checkbox"/>	
AUTOMATIC BYPASS TO SYSTEM	FITTED <input type="checkbox"/>	NOT REQUIRED <input type="checkbox"/>

**FOR ALL BOILERS CONFIRM THE FOLLOWING**

THE SYSTEM HAS BEEN FLUSHED IN ACCORDANCE WITH THE BOILER MANUFACTURER'S INSTRUCTIONS? ☐

THE SYSTEM CLEANER USED \_\_\_\_\_

THE INHIBITOR USED \_\_\_\_\_

**FOR THE CENTRAL HEATING MODE, MEASURE & RECORD**

GAS RATE \_\_\_\_\_ m<sup>3</sup>/hr \_\_\_\_\_ ft<sup>3</sup>/hr

BURNER OPERATING PRESSURE (IF APPLICABLE) ☐ N/A \_\_\_\_\_ mbar

CENTRAL HEATING FLOW TEMPERATURE \_\_\_\_\_ °C

CENTRAL HEATING RETURN TEMPERATURE \_\_\_\_\_ °C

**FOR COMBINATION BOILERS ONLY**

HAS A WATER SCALE REDUCER BEEN FITTED? YES ☐ NO ☐

WHAT TYPE OF SCALE REDUCER HAS BEEN FITTED? \_\_\_\_\_

**FOR THE DOMESTIC HOT WATER MODE, MEASURE & RECORD**

GAS RATE \_\_\_\_\_ m<sup>3</sup>/hr \_\_\_\_\_ ft<sup>3</sup>/hr

MAXIMUM BURNER OPERATING PRESSURE (IF APPLICABLE) ☐ N/A \_\_\_\_\_ mbar

COLD WATER INLET TEMPERATURE \_\_\_\_\_ °C

HOT WATER OUTLET TEMPERATURE \_\_\_\_\_ °C

WATER FLOW RATE \_\_\_\_\_ lts/min

**FOR CONDENSING BOILERS ONLY CONFIRM THE FOLLOWING**

THE CONDENSATE DRAIN HAS BEEN INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS? YES ☐

**FOR ALL INSTALLATIONS CONFIRM THE FOLLOWING**

THE HEATING AND HOT WATER SYSTEM COMPLIES WITH CURRENT BUILDING REGULATIONS ☐

THE APPLIANCE AND ASSOCIATED EQUIPMENT HAS BEEN INSTALLED AND COMMISSIONED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS ☐

IF REQUIRED BY THE MANUFACTURER, HAVE YOU RECORDED A CO/CO<sub>2</sub> RATIO READING? N/A ☐ YES ☐ CO/CO<sub>2</sub> RATIO \_\_\_\_\_

THE OPERATION OF THE APPLIANCE AND SYSTEM CONTROLS HAVE BEEN DEMONSTRATED TO THE CUSTOMER ☐

THE MANUFACTURER'S LITERATURE HAS BEEN LEFT WITH THE CUSTOMER ☐

**COMMISSIONING ENG'S NAME** PRINT \_\_\_\_\_ CORGI ID No. \_\_\_\_\_

SIGN \_\_\_\_\_ DATE \_\_\_\_\_

# SERVICE INTERVAL RECORD

It is recommended that your heating system is serviced regularly  
and that you complete the appropriate Service Interval Record Below.

**Service Provider.** Before completing the appropriate Service Interval Record below, please ensure you have carried out the service as described in the boiler manufacturer's instructions. Always use the manufacturer's specified spare part when replacing all controls

**SERVICE 1** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**SERVICE 2** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**SERVICE 3** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**SERVICE 4** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**SERVICE 5** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**SERVICE 6** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**SERVICE 7** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**SERVICE 8** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**SERVICE 9** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**SERVICE 10** DATE

ENGINEER NAME

COMPANY NAME

TEL No.

CORGI ID CARD SERIAL No.

COMMENTS

SIGNATURE

**Vaillant Ltd**

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